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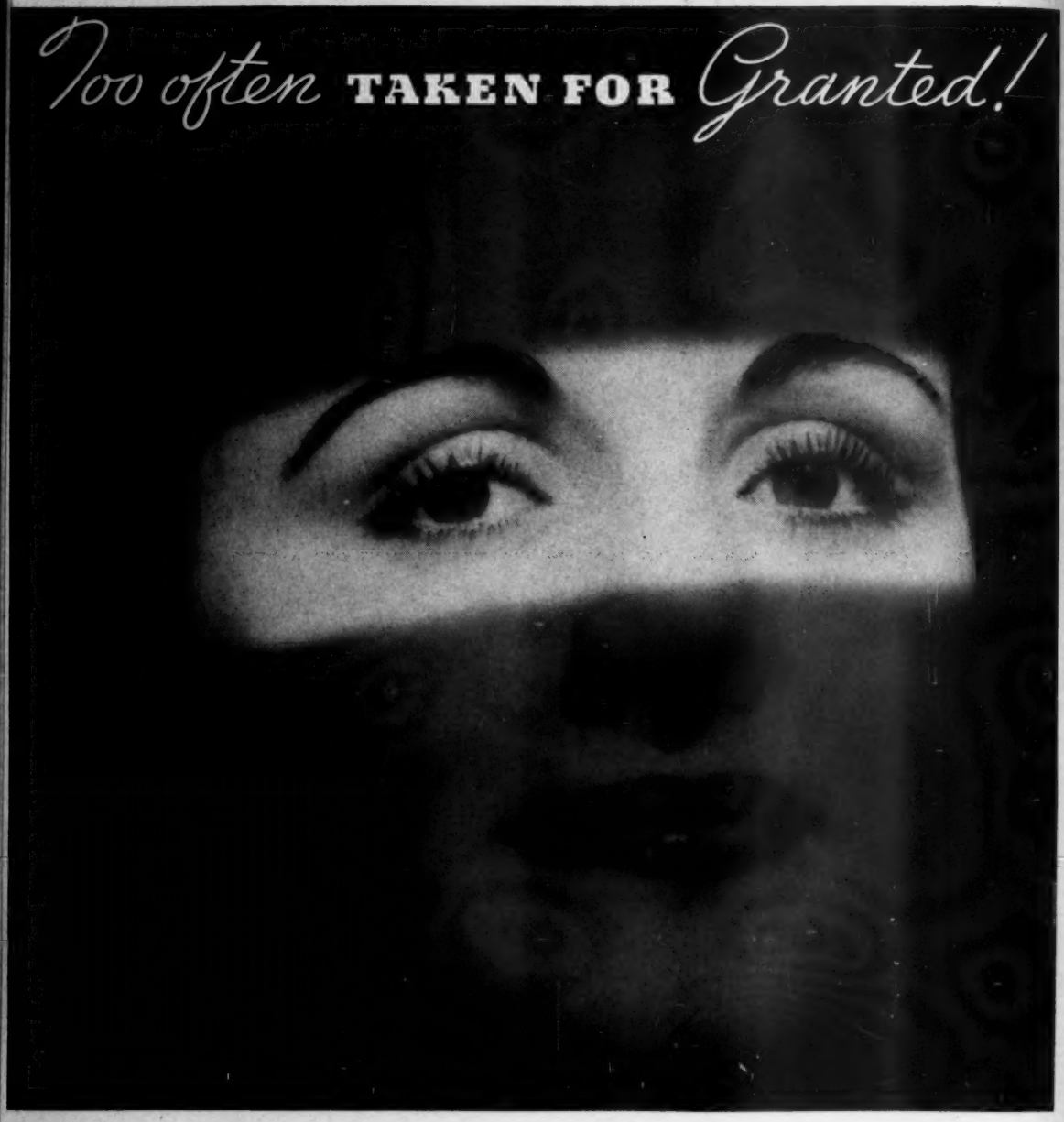

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AMERICAN JOURNAL OF OPHTHALMOLOGY
VOLUME 18 FEBRUARY, 1935 NUMBER 2

GONIOSCOPIC FINDINGS AFTER ELLIOT OPERATION

MANUEL URIBE TRONCOSO, M.D. AND ALGERNON B. REESE, M.D.
NEW YORK CITY

Properly trained in the use of the gonioscope and in the anatomy and physiopathology of the region, the ophthalmologist may examine the angle of the anterior chamber and mark the results of Elliot trephining. In a study of 29 eyes so examined, the authors find three main complications: viz., incarceration of the ciliary processes in the operative opening; incarceration of the iris in the sclera; and exudations adherent to the ciliary body and sclera. In the authors' opinion, the width of the peripheral synechia determines the entrance of the trephine, whether into the anterior or posterior chamber. The significance of this factor is discussed. From the Institute of Ophthalmology, Columbia-Presbyterian Medical Center. Read before the Oxford Ophthalmological Congress, at Oxford, England, in July, 1933.

It was formerly impossible to examine the angle of the anterior chamber in the living eye after operations had been performed in this region and to determine when the healing process had been normal, when faults of technic had been committed, and when complications had arisen imperiling the future of the eye. Several observers have made microscopical examinations of eyes enucleated after the Elliot operation, but these eyes were removed only after infection, inflammation, and other serious complications had arisen. Thus Ducamp[1] examined the enucleated eye of a diabetic and albuminuric patient suffering from hemorrhagic glaucoma, who did not get relief from pain and hypertension after an Elliot operation. He found a hemorrhagic retinitis and detachment of the choroid. At the angle, the anterior border of the wound was lined with a flap of corneal tissue which had been left by the operation and was everted. The posterior border of the hole was lined with iritic tissue which occluded the aperture up to the surface of the cornea and hindered filtration. This incarceration of the iris was not due in the author's opinion to a defective technic, but to a large Knies adhesion.

G. M. Byers[2] found in an eye affected with simple glaucoma, which remained inflamed and painful after the Elliot operation and was enucleated nine months afterward, a dislocation of the lens, which pressed against the opening of the wound. The capsule was ruptured. There were, besides masses of pigmented cells streaming forward into the wound around the protruding sclera, enormous numbers of proliferated endothelial cells and granulation tissue extending along Descemet's membrane and forward, plugging the aperture. A plastic inflammation of the whole uveal tract was in progress.

In a second case, in which the eye was enucleated two months after trephining, there was an ectatic scar lined for the most part with atrophied ciliary body. The concavity of the bleb was almost entirely occupied by a vitreous prolapse. A narrow patent channel lying behind the section of the cornea, extended from the bleb to the posterior chamber. The iris was atrophied and intimately adherent to the cornea. The lens was displaced downward, zonular fibers were ruptured, and the vitreous filled the filtration channel.

Maggiore[3] made a great number of experiments on rabbits' eyes, finding that the simple removal of a portion of the sclero-corneal limbus was useless, the wound being always closed later by thick connective tissue. But when an incarceration of the iris or uveal tissue was experimentally produced, the wound did not close, the blocking being more effective where a greater number of pigmented cells was interposed between the lips of the aperture. Re-

cently one of us (Dr. A. B. Reese[4]) had the opportunity of examining histologically several eyes which had to be removed for complications after Elliot's operation, and he found in all an incarceration of the ciliary processes in the inner part of the sclera, in different degrees and positions. His findings were described in a paper[4] read before the Section on Ophthalmology of the American Medical Association, in 1933. Four of these cases are summarized

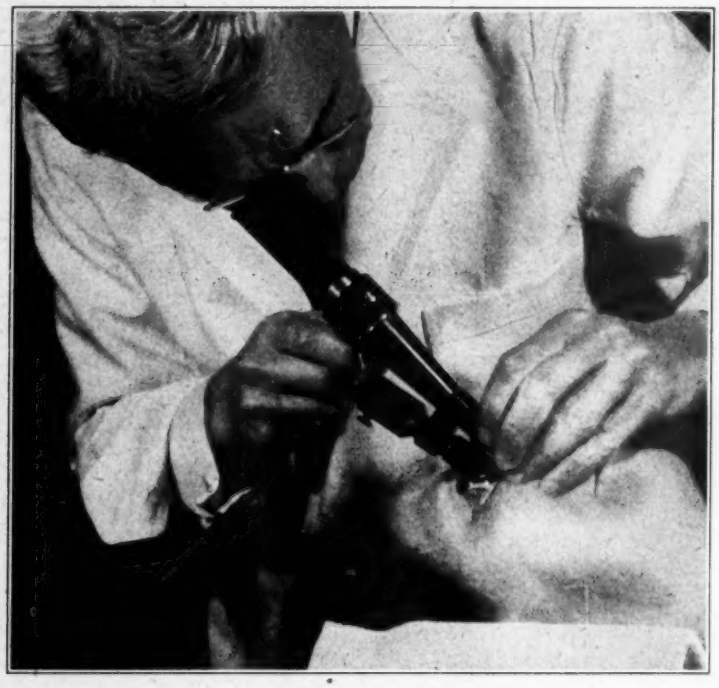

Fig. A (Troncoso and Reese). Method of using the gonioscope. The new contact glass C is applied to the eye and the observer directs the light to the angle of the anterior chamber. Note that the part of the angle examined is not the one opposite, but on the same side of the observer. The tip of the instrument is moved slowly back and forth on the axis of the tube to focus the image. The upper end is moved up and down slowly, to change the plane of observation from a position parallel to the iris surface to an oblique inclination, which permits the examination of the whole sinus of the chamber.

Fig. 1 (Troncoso). Case 1, right eye.

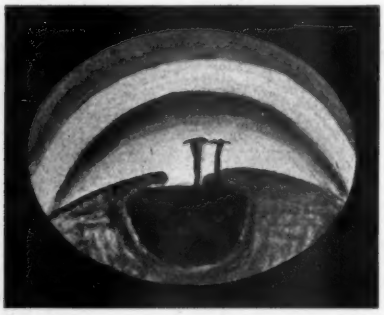

Fig. 2 (Troncoso). Case 1, left eye.

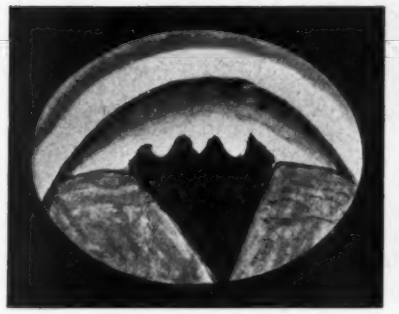

Fig. 3 (Troncoso). Case 2, right eye.

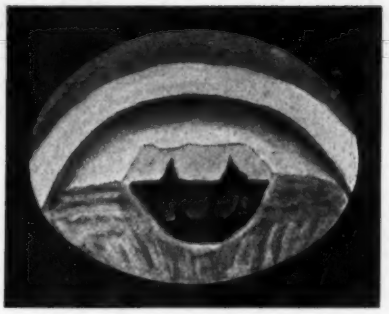

Fig. 4 (Troncoso). Case 3, right eye.

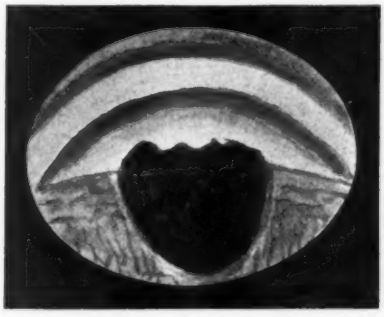

Fig. 5 (Troncoso). Case 4, left eye.

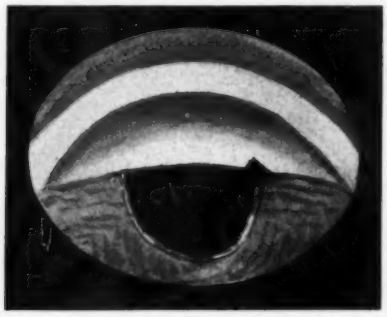

Fig. 6 (Troncoso). Case 5, left eye.

Fig. 7 (Troncoso). Case 6, right eye.

Fig. 8 (Troncoso). Case 6, left eye.

Fig. 9 (Troncoso). Case 7, right eye.

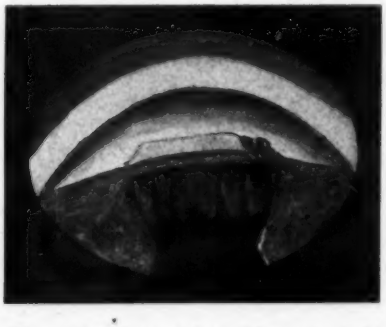

Fig. 10 (Troncoso). Case 7, left eye.

Fig. 11 (Troncoso). Case 8, right eye.

Fig. 12 (Troncoso). Case 9, left eye.

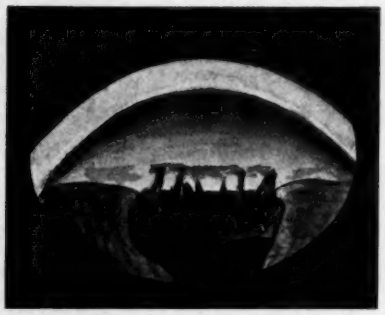

Fig. 13 (Troncoso). Case 10, right eye.

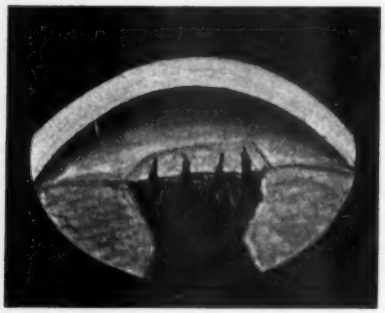

Fig. 14 (Troncoso). Case 10, left eye.

Fig. 15 (Troncoso). Case 11, left eye.

Fig. 16 (Troncoso). Case 11, left eye up.

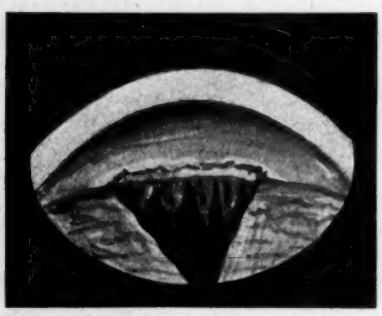

Fig. 17 (Troncoso). Case 12, left eye lower.

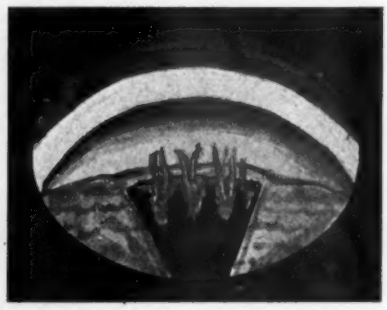

Fig. 18 (Troncoso). Case 12, left eye upper.

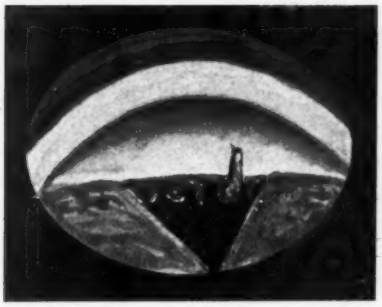

Fig. 19 (Troncoso). Case 13, right eye.

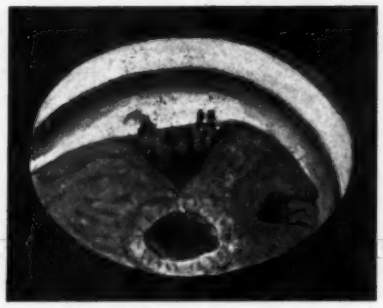

Fig. 20 (Troncoso). Case 13, left eye.

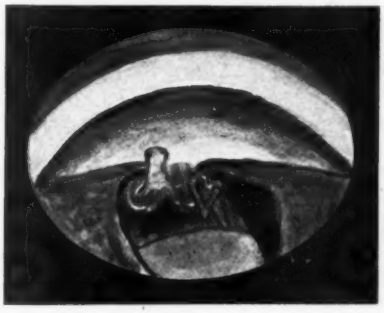

Fig. 21 (Troncoso). Case 14, left eye.

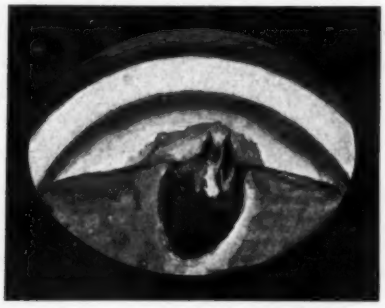

Fig. 22 (Troncoso). Case 15, left eye.

here for comparison with the lesions found with the gonioscope, as will be mentioned later.

Since in his first paper on gonioscopy (1925) M. Uribe Troncoso[6] had described cases of abnormal healing with incarceration of the ciliary processes in the scar after Elliot's operation, the new microscopical findings of Reese attracted his attention again to the frequency of complication, and we decided to examine a number of patients with the gonioscope to determine if, in the living eye, these complications existed, and what was their proportion to normal healing. We examined 22 patients and 29 eyes. Fourteen of these patients belonged to the Vanderbilt Clinic of the Presbyterian Hospital in New York and were operated on by different surgeons; eight were the private patients of Dr. John M. Wheeler. We wish to thank Dr. Wheeler in this place for his kindness in allowing the examination of his patients. Our purpose was especially to see if in a series of cases in which the operation was performed by a surgeon of great ability, such as is Dr. Wheeler, the same number of complications might be present.

The Methods of Gonioscopy

In order to examine the angle correctly and to make the proper interpretation of the conditions found, it is necessary (1) that the observer have acquired sufficient skill in the technic of the gonioscope, and (2) that he have an adequate conception of the anatomy and physiopathology of the region. This is still more important when the angle is examined after operation, because the observer must detect lesions placed in different planes and at different levels, and should be able to correlate the findings with the conditions that existed before the operation. The angle should be examined first in a plane exactly tangential to the iris, then on a higher plane, but parallel to the first, and finally at an oblique angle and in different directions.

The observer has to determine: (1) if the hole of the operation is open or

closed. This is not usually easy. A drop of fluorescein may be instilled in the eye and its course observed, either directly with the light of the gonioscope or by transillumination. When there is pigment on the borders or in the aperture inside the scleral limbus (figs. 11 and 12) or uveal adhesions (figs. 7, 8, 9) the site of the hole is easy to find, otherwise it is usually impossible to locate the scar of the operation and determine if it be open or not.

(2) The next step is to find out if the root of the iris has been entirely removed by the iridectomy (figs. 1, 3, 4, 6), if a rim of iris tissue at the base of the coloboma has been left (figs. 10, 17, 18) or if ragged iris flaps have been cut out (figs. 2 and 21) and are adherent to the sclera. It is convenient to examine the angle on each side of the coloboma to see if a peripheral synechia existed previously and how extensive it was. For this purpose it is also important (although this could be done later, at the end of the examination) to determine if the other parts of the angle around the limbus are open or closed.

(3) The inner white surface of the sclera is entirely free and has its normal width in uncomplicated cases, but in others it may be that either there is an adhesion of the iris root to the inner aspect of the wound (figs. 7, 8, 9, 16) or that the root has been removed, and yet the base of the coloboma is raised and has become attached to the wound (fig. 15). It should be remarked that a difference is apparent between cases in which the root of the iris, although left in place, has kept its position at the same level as the iris on each side (figs. 10 and 18) and those referred to above, in which there is an attachment of the iris to the scleral scar at an upper level (figs. 7, 8, etc.).

(4) The ciliary processes have remained undisturbed behind the iris (figs. 6, 10, 11, 12, 17) or they may have been pulled forward into the anterior chamber and become adherent to the wound, either isolated (figs. 2, 4, 19, 20, 21), or the whole row of processes may have become dislocated into the anterior chamber (figs. 1, 3, 5). Sometimes they adhere to the scleral scar by a single black thread (fig. 1) by two or three (figs. 2, 4, 8, 22) or the whole row of elongated, distorted processes has been drawn forward and remained attached to the inner sclera (figs. 8, 13, 14). In the case of a dislocation without apparent attachment of the tips (figs. 3, 5) it is probable that the base of the whole row has become adherent. The elongated shape of the processes that are reduced to black threads or to conical projections should be accounted for as due to the traction that the attachment and subsequent cicatrization make upon them. When this traction and elongation has lasted for a long time, the processes degenerate, lose their pigment either on the sides (fig. 13) or totally (fig. 18), and become brownish or white.

(5) The last step is to look for symptoms of inflammation: exudations on the edges of the coloboma and pupil and membranes covering the new aperture of the iris or attached to the sclera. Posterior synechiae and exudations are frequent. Sometimes they almost completely obliterate the coloboma (figs. 7, 8, 9, 15 and 16) or reduce it to a narrow slit (figs. 9, 16) or rarely form stout bands of connective tissue which bind the iris to the sclera (figs. 7, 15). The inflammation may have been so active at a certain period that, as in figure 22, the processes are buried in a mass of connective tissue and remain adherent to the scar by a membranous projection. In other cases the membranes are thin and either adherent to the processes and the scar (fig. 12) or line the sclera inside (figs. 4, 10, 14).

For the proper interpretation of the pathogenesis of these adhesions and incarcerations, it is necessary to bear in mind the pathological anatomy of the region in cases of glaucoma. The adhesion of the root of the iris to the sclera forms a new angle forward, in front of the normal one, and the anterior chamber becomes shallow.

The forward movement of the iris root is most probably due to the combined action of the congestion and swelling of the ciliary body and processes at the place where the peripheral synechia forms and the edema of the

vitreous. In microscopic sections of eyes enucleated after acute glaucoma, the processes appear greatly enlarged by edema and extend into the posterior chamber, compressing the root of the iris forward (Friedenwald, Reese). Even when the vitreous swelling subsides the processes, by reason of their connection with the root, remain nearer to the scleral wall of the angle. When the ciliary processes are edematous enough to extend into the posterior chamber and encroach upon the posterior surface of the iris, they are naturally swept into the trephine opening immediately when the eye is opened, as the intraocular pressure is suddenly reduced from above normal to zero. After the iridectomy, the processes may remain entangled in the wound or recede back. If they are incarcerated, contracture of the reparative scar tissue around the operative wound while the fistula remains open has a tendency to drag the processes forward, especially if the bleb bursts and the aqueous escapes, suddenly lowering the intraocular pressure again. These mechanical conditions account, in our opinion, for the frequency of the dislocation and incarceration of the processes into the scar; especially (but not always) when the root of the iris has been entirely removed.

Some authors think that these complications arise particularly when the trephine hole is made too peripherally but this is probably not the case. Although the operation may be technically correct and the aperture made at the sclero-corneal junction, the inner aspect of the hole may fall in different positions about the iris, according to the depth of the peripheral synechia. If this is narrow or *trabecular*, that is, if the root of the iris is adherent to the trabecular zone, the inner hole usually lies in front of the iris, and when the iridectomy is performed the iris prolapses freely through the opening, but the root remains and is seen with the gonioscope above the coloboma. When the peripheral synechia is deeper or scleral, that is, when the iris root is adherent to the sclera near or upon the corneoscleral junction, the trephine finds the iris itself or penetrates bodily through the synechia into the posterior chamber. In the majority of these cases, probably, the root of the iris is thoroughly cut through but the ciliary processes, being nearer to the hole than in the narrow synechia and finding a passage through the coloboma, are dragged into the wound and usually remain there for ever. This interpretation is supported by the microscopical sections of the eyes, represented in figures 23 to 26, which are reproduced from the paper by Dr. A. B. Reese mentioned before. In figure 23 the scleral fistula is widely open and the most anterior row of processes is largely incarcerated in the wound. With the gonioscope, should the examination have been possible at the proper time, the processes may have appeared wholly dislocated into the anterior chamber and attached to the wound. In figure 24, the hole is closed by a bridge of connective tissue to which one process is attached. In figure 25, the iris is incarcerated in the wound, which is filled with a large amount of pigment. In this case the gonioscope would probably have given a picture similar to that in figures 7 and 9, the processes being concealed by the attached iris. Figure 26 shows a completely cicatrized hole to which the iris is adherent, dragged upward, and folded. The gonioscope would probably have shown the root of the iris remaining, and the iris attached high up to the sclera as in figures 7 or 9.

The history of the clinical cases will be found abstracted in the accompanying tables.

Table 1

STATISTICAL DATA

Number of patients examined	22	
Number of eyes examined	29	
	Eyes	Percent
Incarcerated ciliary processes	12	41.3
Incarcerated iris	7	24.1
Incarceration of both processes and iris	1	3.4
Exudations in the angle with attachments to the ciliary body or sclera or both	6	20.6
Normal healing	3	10.3
Marked postoperative iritis with posterior synechia	7	24.1

The majority of the patients were suffering from chronic, primary glau-

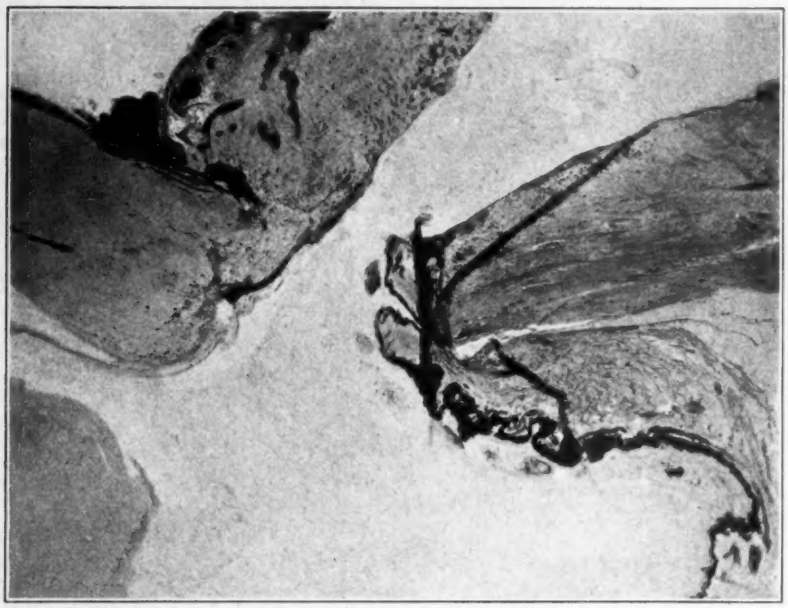

Fig. 23 (Reese). Section of an eye enucleated after trephining. The scleral opening is placed close to the scleral spur. The fistula is widely open and the most anterior row of processes is incarcerated in the wound. The filtering bleb has been displaced in preparation. The equator of the lens is displaced forward, almost to the posterior surface of the cornea.

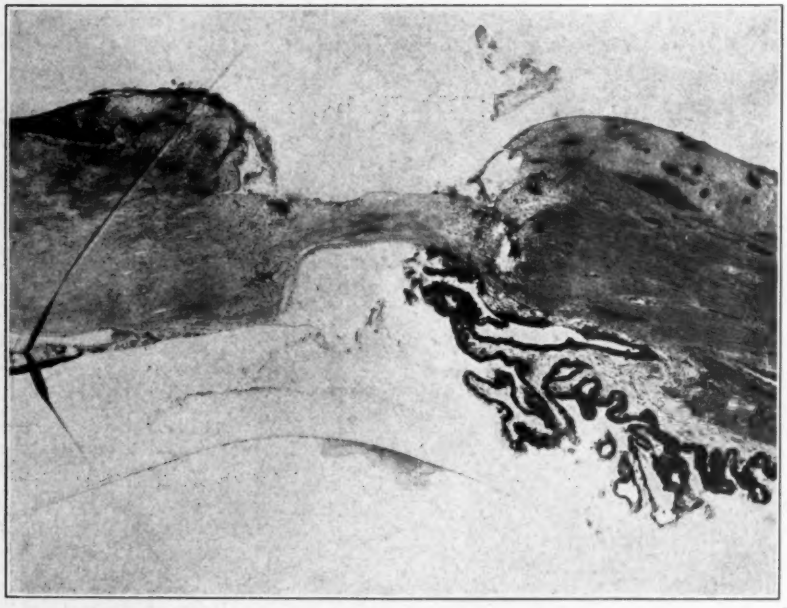

Fig. 24 (Reese). Section of an eye enucleated after trephining. The trephine opening is well placed centrally from the scleral spur. The opening is partially filled by a bridge of fibrous tissue, to which the ciliary processes are attached. The root of the iris is seen applied against the posterior surface of the cornea.

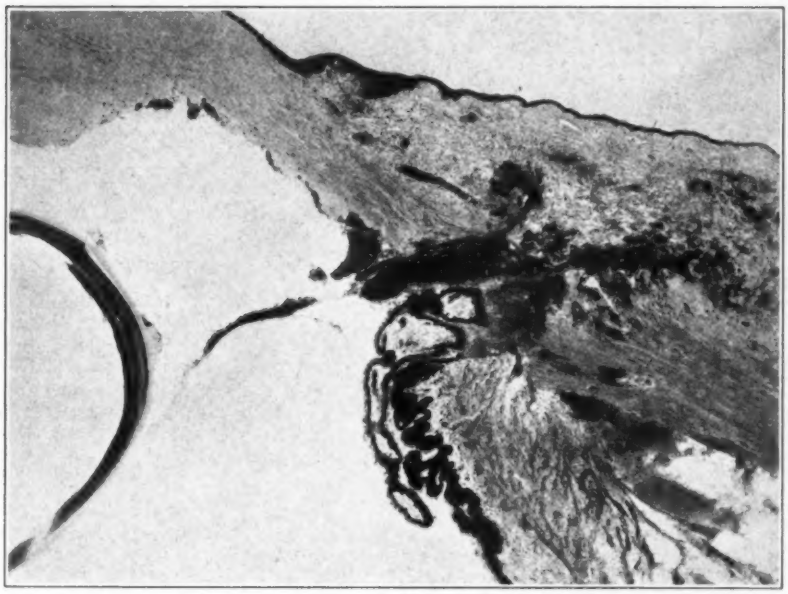

Fig. 25 (Reese). Section of an eye enucleated after trephining. The trephine hole is partially filled with loose connective tissue, in the interstices of which pigment is present. The opening is about 1 mm. central to the scleral spur. A large ciliary process is incarcerated in the wound. The lens is advanced far forward, almost to the posterior surface of the cornea.

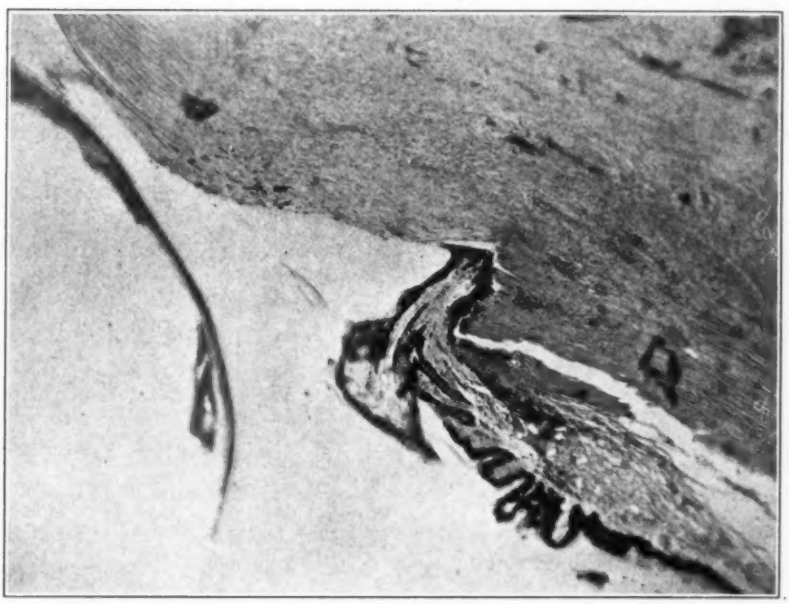

Fig. 26 (Reese). Section of an eye operated on by Lagrange sclerectomy. The incision, which is almost completely filled with blood, is close to the scleral spur. The ciliary processes are incarcerated. A portion of the posterior surface of the cornea at the limbus has been excised.

Table 2

GONIOSCOPY AFTER TREPHINING

Case	Diagnosis	Principal Symptoms	Fundus	Vision	Tension	Gonioscopy	Operation	Comments
1. Mrs. R. K.	R.E. Chronic congestive glaucoma with acute exacerbation. Examined May, 1932	Vision failing for some time in R.E. Colored halos. 7 months before examination attack of foggy vision. On June 3, 1932, had subacute symptoms—pain, halos—and was operated on (Elliot)	Deep cupping. Marked angiosclerosis of retina with small hemorrhages	20/40	31 mm. Hg. After operation, 20 mm.	Ciliary processes dislocated, pulled forward and attached to sclera by thread of black tissue (fig. 1)	Trephining June 3, 1932	Good, immediate results. Tension down. Vision
	L.E. Same	Congestive attack June 7, 1932; trephining	Initial cupping	20/20	31 mm. Hg; June 7, 1932, 40 mm.; after operation 31–34 mm.; Feb., 1933, 25 mm.	Root of iris left flaps on sides of coloboma. Two processes dragged forward (fig. 2)	Trephining June 17, 1932	Good immediate results. Tension down. Vision good. Angle open
2. Mrs. E. J.	R.E. Chronic congestive glaucoma. Examined October, 1930	Acute attack. Trephining elsewhere. Iridocyclitis. Deposits in Descemet's membrane		20/30	20 mm. Hg. After operation in April, 1933, 15 mm.	Hole not apparent. Whole row of processes is dislocated into anterior chambers and attached to sclera (fig. 3)	Trephining Aug., 1930	Mild iridocyclitis
	L.E. Same	Dec., 1929, acute attack. Trephining. Iridocyclitis after operation, cornea turbid. Exudates in iris. Cataract		20/200	32 mm.	Hole bluish and wide. Cornea turbid. Posterior synechia. Processes in place	Trephining June, 1930	Severe iridocyclitis. Vision very much reduced
3. Mrs. A. F.	R.E. Chronic congestive glaucoma. Examined March 28, 1932	Attacks of pain and failing vision for the past 6 years. 2 years ago vision lost. Trephining to allay pain	Cupping	L.P.	March, 1932, 90 mm. Hg. After operation, Nov., 1932, 14 mm.; March, 1933, hypotony	Partial iridectomy. Two processes are pulled forward. Large conical, black projections attached to sclera (fig. 4). Behind them white exudation	Trephining April 5, 1932	Hypotony after operation in a blind eye
	L.E. Partner	No symptoms	Disc normal	20/30	35 mm. Hg			
4. Mrs. C. T.	R.E. Normal							
	L.E. Chronic congestive glaucoma. Examined March, 1932	Attack with great pain 6 months before. Mydriasis. Iris atrophic	Deep cupping	Hand movements and then blind	Entrance 52 mm. Hg; March 25, 23 mm. April, 1933, 50 mm.?	Wide partial iridectomy. Whole row of processes dislocated into ant. cham. and adherent to sclera—Behind several rows of conical irregular processes (fig. 5)	Trephining March 15, 1932	Advanced case. Bad result. Hypertension recurred. Vision lost

5. Mrs. M. S.	R.E. Chronic congestive glaucoma. Jan. 5, 1932	O.U. Consulted for glasses. Vision failing. Pupils dilated and oval	Deep cupping	20/200			Myotics	Advanced case
	L.E. Same	On Jan. 16, 1932, acute attack. Refused operation until Jan. 28–Sept.,1932, Iridocyclitis. Corneal dystrophy	Ditto	15/200	52 mm. Hg. on attack. Feb., 1932, 16 mm. after operation. Sept., 1932, 26 mm., 36 mm.	Wide partial iridectomy. Ciliary processes in place. Fold of iris border incarcerated in wound (fig. 6)	Trephining Jan. 28, 1932	O.S. After acute exacerbation myotics, then trephining. Immediate fall of tension followed by iridocyclitis and again hypertension
6. Mrs. S.J.H.	R.E. Simple glaucoma. March 6, 1922, Dec. 23, 1933	Vision failing since 1922. Trephining done 3 yrs. ago. Cataract 1 yr. later. Exam.: Pupil contracted. Iridocyclitis. Posterior synechia. Lens opaque	Invisible	L.P.	43 mm. Hg; 23 mm. after operation	Hole open, iris adherent to scar in an anterior synechia (fig. 8). Strand of exudate bridging the coloboma, which is filled with threads of exudation	Trephining June, 1930	Advanced case with iridocyclitis after operation
	L.E. Same	Vision blurred, colored halos since 1922. Had an iridectomy done 7 yrs. ago and 3 yrs. ago a trephining in the same eye	Disc pale, shallow central excavation. Angiosclerosis of retina	20/20	36 mm. Hg; 23 mm. after operation	Besides a wide iridectomy, there are a smaller coloboma and trephine hole at "10 o'clock," where there is a large bleb. In large coloboma, processes are discolored and shrunken. In small coloboma, large anterior synechia. Three processes like black threads are attached to sclera (fig. 7)	Iridectomy in 1923. Trephining in 1930	Good result of iridectomy. Vision preserved, trephining lowered tension
7. Mr. I. M.	R.E. Simple glaucoma. April, 1933	Diabetes and failing vision for many years. On examination, evidence of iritis	Cupping	Sept., 1929 20/200 April, 1933 H.M.	42 mm. Hg; 24 mm.	Coloboma reduced to a slit (fig. 9). Root of iris attached to sclera in a narrow ant. synechia. Exudations. Processes invisible	Trephining Oct., 1929	Advanced case Trephining lowered tension but vision steadily decreased. Iritis
	L.E. Simple glaucoma	Anterior segment normal	Cupping	Sept., 1929 20/100 April, 1933 F. at 3 ft.	45 mm.; 26 mm.	Wide iridectomy. Root of iris left. It is attached to sclera on temporal side. Narrow exudate above root. Processes discolored, but in place (fig. 10)	Trephining Oct., 1929	Ditto
8. Mrs. R. W.	R.E. Chronic congestive glaucoma	Failing vision for a long time. Field shows concentric contraction, almost to fixation point. Trephine operation 5 yrs. ago lowered tension, which has been normal ever since	Complete excavation	20/20 Same	40 mm. Hg	Partial iridectomy. Ciliary processes in place. Above triangular exudate, apex continuous with hole (fig. 11). Iritis	Trephining	Trephining lowered tension, which has remained normal for 5 years
	L.E. Ditto	Ditto. Trephining was followed by low grade iritis and 6 months later the lens became cataractous, reducing vision	Ditto	20/50 10/200	42 mm. Hg		Trephining	Trephining was followed by iritis and cataract

Table 2 (Continued)

GONIOSCOPY AFTER TREPHINING

Case	Diagnosis	Principal Symptoms	Fundus	Vision	Tension	Gonioscopy	Operation	Comments
9. Mr. W. B.	R.E.	Partner		20/30	16 mm. Hg			
	L.E. Chronic congestive glaucoma. April, 1932	Since Nov., 1931, had pain and reduced vision. Exam.: Cornea steamy. Mydriasis. Cataract. Iridocyclitis after 2d operation	Invisible	20/100 20/70	52 mm. Hg; July 1932, 19 mm. 52 mm. Nov., 1932, 18 mm., 43 mm.	April, 1932. Wide iridectomy. Processes atrophic but in place. Iridocyclitis. Inner hole, pigmented, stands on base of a triangular exudate whose apex is adherent to process (fig. 12)	Trephining July, 1932 2d Trephining Oct., 1932	After two trephine operations tension still high. Iridocyclitis
10. Mr. W. M.	R.E. Simple glaucoma	Failing vision for years, which has progressed to blindness. O.U. anterior segment normal	Deep cupping	Blind	26 mm. Hg	Complete iridectomy, root of iris removed. The whole row of processes drawn forward and adherent to sclera. Stretching has reduced them to long, black bands or conical projections with white degenerated streaks (fig. 13)	Trephining	Very far advanced case. Operation lowered tension but vision was lost in both eyes
	L.E. Simple glaucoma	Ditto	Deep cupping	Blind	26 mm. Hg	Same condition. Processes are all black. On the anterior row they are attached to exudate lining sclera (fig. 14)	Trephining	
11. Mr. C. W.	R.E. Absolute glaucoma April, 1932	Operated on, R.E., for glaucoma 18 years ago. Eye blind and atrophic	Invisible	Blind	T			Atrophic
	L.E. Chronic congestive glaucoma with exacerbation	Vision failing for 15 months Examined. Subacute attack of glaucoma. Myotics. Trephining. Tension remained high and a 2d operation was done. Iridocyclitis	Cupping	20/70	43 mm. Hg	Coloboma is pear shaped. Root of iris attached to sclera for a certain length. Posterior synechia. Occlusion of coloboma by a membrane; 2d coloboma, downward and larger. Borders drawn up and incarcerated in scar. Exudate covers coloboma with a thick, corrugated edge attached to scar (fig. 15)	Trephining, Feb., 1932 2d trephining, Mar., 1932	Return of tension after 1st and even after 2d trephining. Iridocyclitis
12. Mr. J. G. (Dr. Wheeler)	R.E. Simple glaucoma. April, 1922	Diabetic. Incipient cataracts in both eyes. Failing vision, no pain	Cupping	20/200 Hand movements	38 mm. Hg; 26 mm. Hg;			
	L.E. Chronic simple glaucoma. April, 1929. July, 1934	Subacute exacerbation in chronic glaucoma. Trephining. Tension came down and again increased; 2d operation performed	Cupping	20/100 20/70 after operation	55 mm. Hg. Normal, then again 50 mm. Hg	Upper side partial triangular iridectomy. Iris root left; is drawn up and attached to sclera. From processes several slender, white threads of exudate run up to the scar (fig. 18). The lower trephining has small iridectomy. Processes in place. Exudate with serrated upper edge attached to limbus (fig. 17)	Trephining, April, 1929; 2d trephining, below, May, 1930	Relapse of hypertension after two trephinings. Mild iritis

13. Mr. F. H.	R.E. Chronic congestive glaucoma in both eyes. Examined, March, 1933	October, 1929, trephine operation on both eyes for chronic glaucoma. In December, 1929, pain returned in L.E. and a 2d trephining was done. Vision gradually being reduced. Became very near-sighted Exam. R.E.: filtering bleb. Pupil dilated, oval. Field: central island left	Deep cupping	20/40	36 mm. Hg	Triangular iridectomy. Processes in place. Band of exudate from process to sclera (fig. 19)	Trephining Oct., 1929	Apparently good results with some hypertension and reduced vision
	L.E.	Large bleb at "2 o'clock." Redness and pain. Hypotony. Cataract	Invisible	20/100	10 mm. Hg	Upper coloboma is complete to the sclera. Three processes are drawn up and attached to sclera. Annular posterior synechia. Temporal coloboma smaller with irregular, thick, adherent borders. Processes in place (fig. 20)	Trephining Oct., 1929; 2d trephining, Dec., 1929	Two trephinings with final hypotony. Severe iridocyclitis
14. Mr. S. F. (Dr. Wheeler)	R.E. Simple glaucoma. Nov., 1930. Mar., 1933	Vision failing for 4 years, halos, no pain. Persistent hypertensions	Deep cupping	20/15 20/20 after operation	38 mm. Hg; 27 mm. after operation		Trephining April, 1931	
	L.E. Simple glaucoma	Vision blurred since 1922. No pain. Persistent hypertension made operation necessary. Iritis	Normal	20/50 20/30 after operation	20 mm. Hg; 18 mm. after operation	Broad iridectomy. Iris root removed only in center of coloboma. Temporal border of iris split, the pigment layer remaining attached to lens. Processes in place. Band of exudate from inner process to the sclera	Trephining April 21, 1931	Vision and tension improved after operation. Field normal. Processes in place. Iritis
15. Mr. S. A. (Dr. Wheeler)	R.E. Secondary to tuberculous uveitis. August, 1930. July, 1933	Uveitis developed in Oct., 1930, and later hypertension, with severe pain. Arthritis. Trephining	Normal	20/30	43 mm. Hg; 26 mm. after operation	Broad partial iridectomy. Root of iris left, is adherent to sclera. Processes in place	Trephining Oct. 21, 1930	Operation reduced the tension and preserved vision
	L.E. Ditto	During course of tuberculous uveitis hypertension appeared with pain and failing vision in August, 1930. Medical treatment being of no avail, trephining was done	Invisible	Fingers at 3 feet	53 mm. Hg; 15 mm. after operation	Borders of coloboma bound to lens (fig. 22). Processes are drawn upwards and thinned to black threads which adhere to a thick exudate attached to sclera. Another large exudate between the processes	Trephining Aug. 26, 1930; 2d trephining July 10, 1931	Tension reduced but vision was lost by the uveitis

Table 2 (Continued)

GONIOSCOPY AFTER TREPHINING

Case	Diagnosis	Principal Symptoms	Fundus	Vision	Tension	Gonioscopy	Operation	Comments
16. Mrs. P. R.	R.E.	Partner			Normal			
	L.E. Chronic congestive glaucoma. April, 1932	Hypertension, cardiovascular disease for several years. In Feb., 1931, pain and inflammation developed and trephining was done. On Exam.: iritis, initial cataract	Deep excavation	20/100	16 mm. Hg	Partial triangular iridectomy. Root of iris left. Processes large, distorted and ragged but kept in place. Angle closed all around	Trephining in 1931	Operation reduced tension. Iritis. Processes in place
17. Mr. J. W. (Dr. Wheeler)	R.E. Secondary to uveitis April, 1932. June, 1926	Failing vision for 4 months. Pain. Iridocyclitis. Pupil dilated and fixed	Deep cupping	20/200 same after operation	60 mm. Hg; After operation, 18 mm., 14 mm., 43 mm., 17 mm., 7 mm.	Partial, triangular iridectomy. Root of iris left. Processes large, with crenated borders, but kept in place. In 2d trephining coloboma, processes also in place	Trephining April 7, 1932; 2d trephining Nov. 23, 1932; 3d trephining Mar. 21, 1933. Cyclodialysis May 23, 1933. Lagrange operation Aug. 10, 1933	Three trephining operations on same eye did not relieve the tension. Processes in place. Only a small island, temporal to fixation remains in field
	L.E.	Normal		20/15				
18. Mr. Sch. (Dr. Wheeler)	R.E. Simple glaucoma. March, 1932	Cloudy vision and halos for 6 months, but no pain	Disc pale and excavated	20/70 20/70 after operation	38 mm. Hg; After operation 14 mm.	Root of iris elevated as a mound and adherent to the scar. Processes large, wavy. The innermost is drawn up as a black conical projection (similar to fig. 19). Angle open only nasally	Trephining March, 1932	Operation improved tension. Iris and processes adherent. Field: small island of 15°, temporally to fixation left
	L.E.	Partner	Normal	20/30	27 mm. Hg; 18 mm.			
19. Mr. H. R. (Dr. Wheeler)	R.E. Iritis	After an attack of influenza both eyes became inflamed. Vision lowerd 6 months before first visit. SP. Iritis small, irregular pupil	Disc normal	20/20 20/15	15 mm. Hg			
	L.E. Glaucoma secondary to iridocyclitis. Feb., 1932. March, 1934	Pupil large, bound to the lens by numerous post synechia. Deposits in Descemet's membrane. Early cataract	Deep excavation	Fingers at 1 foot 20/50	55 mm. Hg; 18 mm. after operation	Small partial iridectomy. Root of iris left yellow pigment deposited on sclera. Two processes are drawn forward at each end of the row on black, conical projections	Trephining Sept. 19, 1932	Processes adherent. Operation improved tension. Field reduced to a small island extramacularly

20. Mr. C. K. (Dr. Wheeler)	R.E. Simple glaucoma with acute exacerb. Dec., 1931. Aug., 1933	Vision failing in both eyes for 6 months. No pain. Congestive symptoms: Cornea steamy, pupil sluggish. Trephined twice. Field reduced to a small island about 15° above fixation point	Deep excavation	20/70 10/200 after operation	46 mm. Hg; 33 mm. after operation	Above. Two processes, one conical, the other bandlike, are attached to sclera (similar to fig. 2)	Two trephine operations: Dec. 31, 1931 and April 28, 1932	Hypertension recurred. Vision lowered
	L.E. Same	Ditto. Trephined twice. Field reduced to a small island about 10° above fixation	Ditto	20/100 Fingers at 2 feet after operation	50 mm. Hg; 10 mm. 23 mm. after operation	Processes degenerated, enlarged, and whitish, but in place, in the two colobomas	Trephine operations: Dec. 31, 1931 and April 28, 1932	Ditto
21. Mrs. S. N. (Dr. Wheeler)	R.E. Chronic congestive glaucoma. Oct. 23, 1931. June, 1933	Diabetic. In October, 1931, had acute attack with great pain in R.E.	Deep cupping	20/20 20/40 after operation	37 mm. Hg; 23 mm.	Root of iris left. It is raised up and adherent to sclera in a wide arc. Processes short, broad, and crowded together, but in place	Trephining October 29,	Tension lowered. Iris adhesion to scar
	L.E. Absolute glaucoma		Invisible	No L.P.	70 mm. Hg			
22. Mrs. D.	R.E. Partner							
	L.E. Secondary to syphilitic iridocyclitis. March, 1933	Syphilis for some years. Iridocyclitis in December, 1932. Later secondary glaucoma. Repeated paracentesis failing to relieve tension, two trephine operations were performed	Invisible	Hand movements	60 mm. Hg	Root of iris left is raised in a mound both at "12" and "10 o'clock" and adherent to sclera (similar to fig. 9). Colobomas filled up with exudate. At the place of paracentesis thin anterior synechia. Angle closed all around and filled with pigment debris	Paracentesis several times. Trephining and 2d trephining	

coma and only four had secondary glaucoma consecutive to iridocyclitis.

We do not want to draw conclusions regarding the frequency of the complications described, on account of the relatively small number of cases observed. However, the figures in the table show how great a proportion of the cases had them in comparison with those in which the healing was normal.

The question of these incarcerations being dangerous to the future of the eyes, depends probably on two factors: 1. the patency of the hole, 2. the presence of an iridocyclitis. An open trephine hole is of course more prone to carry infection inwards than a firm occlusion of the scleral wound. The frequency of late infections in some statistics, as those mentioned by many observers at the 1929 meeting of the French Ophthalmological Society,[6] depend probably on the facility with which infection may be carried through the bridge of adherent processes or iris tissue. In our statistics, nevertheless, no late infections have been recorded. This may be due to the short periods (2 or 3 years) during which these patients have been observed. Iritis and iridocyclitis are very frequent after trephine operations. In our table they appear only in 7 cases. But in others there may have been a slight degree of inflammation not recorded in the clinic charts.

Even in the absence of a true inflammatory reaction, following the incarceration of ciliary processes, the continuous pulling and stretching of these structures may cause a chronic irritation of the eyes with undue sensitiveness. Patients in whom these complications result should be watched carefully for earlier symptoms of the conjunctival infections, which may be easily carried into the eye.

Summary

1. The examination of the angle of the anterior chamber in living eyes has passed from the era of experiment and research to the stage of clinical application. The gonioscope and the contact glass have made possible the exploration of this region which was previously unknown in the living eye. With this method, every ophthalmologist, after some training and patience, should be able to see the angle as easily as the anterior segment with the slitlamp. In fact, gonioscopy is a part of the biomicroscopy of the living eye.

2. Gonioscopy can give important information in the following conditions: Congenital anomalies of the angle; injuries; hemorrhages, iridodialysis, inversion of the iris, foreign bodies, etc.; sequelae of iritis and iridocyclitis with secondary glaucoma; atrophy of the iris; anterior corneal synechia after perforation of the cornea; tumors or pseudotumors of the iris; glaucoma in its several types, and pathological conditions in the ciliary processes when they are visible through a coloboma of the iris. A new and interesting application of gonioscopy is the examination of the angle after operation for glaucoma, cataract, etc.

3. The authors report in detail the gonioscopic findings after a trephine operation (Elliot) (see table 1). From the standpoint of the immediate operative result, the 6 cases with exudates could be added to the 3 normal healings (30.9 percent). In some of these cases there was severe postoperative iritis (7 eyes, 24.1 percent). In none of them had a late infection appeared, but the period of observation has not been longer than 2 or 3 years.

4. The authors think that the width of the peripheral synechia determines whether or not the trepanation is made into the anterior or the posterior chamber. When this is narrow or trabecular, the trephine hole is usually in front of the new attachment of the iris, at the site of the new angle. When the peripheral synechia is deep or scleral, the trephine either perforates the iris or falls into the posterior chamber. In the case of the trabecular synechia, the root of the iris is usually left and is often attached to the sclera. The ciliary processes may or may not be dragged forward into the wound. In the case of scleral synechia when the posterior chamber is penetrated, the ciliary processes have a tendency to become incarcerated in the wound.

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References

[1] Ducamp. Cicatrisation des trépanations cornéo-sclerales. Ann. d'Ocul., 1914, v. 151, p. 53.

[2] Byers, G. M. Histologic findings in eyeballs lost through complications following sclero-corneal trephining. Trans. Amer. Ophth. Soc., 1918, v. 16.

[3] Maggiore, L. Contributo sperimentale al mecanismo della cicatrizzazione de la esclerotomia anteriore perforante. Annal. di Ottal. e Clin. Ocul., 1929, August-September.

[4] Reese, A. B. The ciliary processes. Their relation to intraocular surgery. Trans. Sect. Ophth., Amer. Med. Assoc., 1933.

[5] Uribe Troncoso, M. Gonioscopy and its clinical applications. Loc. cit., 1925 (case 10, fig. 29; case 11, fig. 31).

[6] Villard and Bouniot, Terson, Aubaret, Jacqueau, Sourdille, and R. Onfray mention cases of late infection after trephining in Bull. et Mém. de la Soc. Franç. d'Opht., 1929. The last named had two cases of late infection in about fifty operations.

SOCIAL SERVICE IN OPHTHALMOLOGY

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The great value of the social worker to the ophthalmologist, especially in the clinic, is pointed out. Among the many advantages probably the most important is the follow-up. Without this, the conduct of many of the cases to a satisfactory conclusion is impossible.

Read before the American Academy of Ophthalmology and Oto-Laryngology in Chicago, September 17, 1934.

Eight years ago one of us had occasion to give a report on the treatment of glaucoma in the Eye Clinic of Washington University. A review of the cases seen in the clinic for the preceding ten years brought to light some amazing facts. Less than 50 percent of these patients had made more than one visit to the clinic and less than 5 percent were followed for more than six months. In those days there was no social-service worker in the clinic. Today there are two workers and it is most unusual for any glaucoma patient to drop from sight in the first six months of treatment.

The general average of patients coming to operation (when such has been recommended) is said to be about 30 percent. Our record shows that 95 percent of the patients for whom operation is advised in the Washington University Eye Clinic do actually have the operation performed!

We would not take the time of this busy organization to present this paper did we not feel so strongly that the social worker is a necessary adjunct to an efficiently conducted clinic and did we not believe that ophthalmologists, who have in general been keenly progressive, have been unthinkably slow to make use of the social worker.

You may ask in what ways can the trained social-service aid be of assistance to the doctor and why is the type of training that she has had the most desirable for this cooperation with the ophthalmologist. To answer the second question first, an essential to the success of any treatment is the patient's cooperation. This may be totally lacking, insufficient, or at least far short of maximum, because of failure to understand the medical abnormality, the intent of the treatment, inability to adjust home conditions to the needs of the case, or general intellectual incomprehension of the entire situation. It is along these lines that the social worker is an expert. Her training has been based on the study of the reactions of humans as a whole to given situations, with a thorough appreciation of the individual variation in reaction.

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Considering now what the social worker can do for the ophthalmologist: In the clinic program it is most important that a social examination be made of new patients. This will prevent many of the failures to follow up medical directions. Not only is this preliminary advice helpful, but from the very start the patient feels that he has a friend and intermediary who will be of assistance as long as he must continue the clinic contact and who will be an ever present help in time of trouble. In our Washington University Eye Clinic, the social workers in 1933 interviewed 60 percent of approximately 5000 new patients.

Instructing the patient so that he may get the most benefit from the clinic, though the simplest type of social help, is also the most frequently needed and the most satisfactory. Occasionally there is a necessity of modifying the behavior of the patient or his family. To do this efficiently requires technical training.

With understanding of the doctor's findings, the social worker can add emphasis to the recommendations that have been made and explain their significance in relation to the particular eye condition. At the same time she can acquaint the doctor with his patient's social and economic status so that any disturbing material or emotional factors contributing to the physical state, may be duly considered. In the adjustment of such social and economic problems as may exist, the social worker of course has prime responsibility. It is easy to see how important a part such adjustments can play in the treatment of certain eye patients—from those in whom constant fear and worry are creating a state of mind that brings harmful pathological reaction, to those who for financial reasons cannot obtain the advantageous diet, drugs, or lenses that are prescribed. The large number of patients scheduled for continued treatments but lost sight of in the pressure of clinic work is a burden on the mind of any conscientious doctor; under a follow-up system planned and put through by a social-service department, such cases can be followed and the danger of neglected treatment be avoided. We have all experienced the disappointment of refused operations, the failure of patients to accept the hospital care advised; here, too, the social worker can help materially in paving the way to complete medical and surgical care.

In research problems, a social worker with an understanding of eye conditions is prepared to assist the ophthalmologist in collecting and compiling material gathered from hospital and clinic records. Given the requisite background, she can help in analyzing case material.

There are numerous specific diseases in which the social worker can be of especial value; of these glaucoma is typical. A recent five-year report of intensive work with glaucoma patients at the Massachusetts Eye and Ear Infirmary, where a social worker was put in charge of this one group of patients alone, divides her work into three distinct phases: 1, the gathering of data for study; 2, the following of all patients to insure uninterrupted treatment; 3, the carrying through of the social treatment necessary for successful medical care. During three years, average daily attendance grew from seven to thirteen and the lapsed cases on record, together with those under more or less regular surveillance, were systematically traced and brought under control. This same report shows steady increase in the number of primary glaucoma cases admitted for operation—55 in 1928, 115 in 1929, 208 in 1932. The significance of this increase is evident to any ophthalmic surgeon who knows the tendency of clinic patients to avoid operative care and the consequent hopelessness of sight conservation.

Syphilis is a tremendous factor in the incidence of lost and impaired vision. Syphilologists and ophthalmologists alike have more responsibility for its eradication than simply the provision of medical treatment. Treatment without education as to the dangers of the disease to patient, family, and to the public at large, is but a half-way measure. The social worker's skill in interpreting medical findings and recommended procedure, in bringing about the proper tie-up between eye and

syphilis departments, in insuring continuance of treatment over a long period in the face of various and sundry difficulties, is a much needed element in the control of ocular syphilis. As a step toward the prevention of congenital or prenatal syphilis so frequently resulting in damaged eyes, the American Medical Association on June 15, 1933, approved the appointment of a committee to take the matter under advisement with a resolution as adopted by various sections of the American Medical Association calling for the development of such cooperative medical, social, and public-health measures as may eventually bring about the treatment and care of all infected pregnant women. Just within the last month this educational campaign has started, so ophthalmologists should be alive to the situation and should make every effort to help in this great preventive undertaking.

With tuberculosis of the eyes and with trachoma, the social and public-health aspects are also self-evident, as is, again, the need of educating the patient and the family group. Interpretation and the winning of confidence in medical procedure may make possible the operation required in a cataract case, senile or congenital. The doctor has neither time nor opportunity to contribute this service or to put through the plan for improved hygiene, economic security, or educational adjustment that may be called for. Children with progressive myopia, for whom a program of specialized education based on the proper safeguarding of vision is so all important, must be followed.

In spite of existing laws or regulations in practically all of our states providing for the use of a prophylactic in babies' eyes at birth, children are still entering schools for the blind, sightless because of ophthalmia neonatorum. A recent etiological and topographical classification of causes of blindness in 17 schools for the blind in the United States, issued by the Committee on Statistics of the Blind, gives this as the predominant item under infectious diseases, with prenatal syphilis running a close second. What an opportunity ophthalmologists have, cooperating with social workers, to reduce this needless waste.

The same table shows traumatic and chemical injuries as responsible for 7.8 percent of the clinic entrants—a fact indicating the part that a well-prepared hospital social worker can take in building up a community consciousness of eye problems and their alleviation. Someone close to the eye physician in his hospital and clinic practice, seeing the types of cases passing through the department and understanding their significance in relation to public health and the social, industrial, and educational life of the city or locality from which they come, can do much towards bringing about desired improvements where needed—such as adequate provisions for the eye health of school children, eye protection in industry, and prenatal care.

Though medical social work with eye patients began in this country in 1907 with the organization of a social-service department at the Massachusetts Charitable Eye and Ear Infirmary, ophthalmologists have been slow to realize its significance, and its growth has been small in proportion to similar service in other fields of medicine. In 1922 Dr. Conrad Berens brought out the need for fuller recognition of social service in a study made by the Section on Ophthalmology of the Associated Out-Patient Clinics of New York City. Here agreement was expressed with the statement of Dr. George S. Derby that "no hospital at the present day which serves the people can give really efficient service unless it makes provision for social service work and establishes some sort of follow-up system." Through the years, certain other progressive ophthalmologists have emphasized the value of social work—notably Dr. George de Schweinitz who in 1915 called public attention to its vital place in clinic practice. But with unbelievable slowness have eye hospitals and out-patient departments accepted the service as a need, and this in spite of evidence through the New York report and through showings elsewhere that a high percentage of eye patients suffer unnecessarily from visual loss because of

neglected treatment and failure to receive social care.

Relief in hospital social work as a factor in preventing blindness was the urge that brought about employment of that first eye worker in Boston in 1907, and it was with the same belief that years later, in 1931, the National Society for the Prevention of Blindness undertook intensively to stimulate the more general employment of qualified personnel in this field. From Boston again came the initial step, when Dr. Derby, of the National Society's directorate and Professor of Ophthalmology at Harvard University, offered the facilities of the Massachusetts Eye and Ear Infirmary as a training center for selected medical social workers to specialize in eye conditions. The National Society responded to this idea of Dr. Derby's by granting scholarships to the students selected and by providing staff service in administering the project.

It is our firm belief that a medical social worker serving in the field of ophthalmology should have special preparation in order to function effectively. Without some understanding of the eye and its involvements how can she interpret the doctor's findings; how can she intelligently plan a program of adjustment for the patient without a realization of the conflicts growing out of a visual handicap and a knowledge of resources that may be used or developed for the patient's welfare? Furthermore, if she is to be used, as she should be, for creating a community interest in sight conservation, she must know whereof she speaks. However, we do not mean that only in special courses of training can the required knowledge be obtained. A high-grade medical social worker can through actual experience in a well-organized eye department gain a thorough understanding of her work and develop expert technic; but the process is a long and, to our minds, a wasteful one. In the interests of economy and of first-class service, intensive training courses have been sponsored by the National Society for the Prevention of Blindness and will be available this fall to a limited number of qualified candidates who have positions in view. To date, 12 medical social eye workers have been prepared in Boston and through a second four-months' training course established later at Washington University, St. Louis; perhaps the number would have been larger but that it is far from the intention of those who are responsible to provide trained workers for whom there is no demand, and that ophthalmologists calling for social workers are few and far between.

In conclusion we most earnestly urge ophthalmologists to awaken to the tremendous advantage to be gained through the aid of social service, and to avail themselves of any opportunity to secure this most valuable cooperation.

UNILATERAL EXOPHTHALMOS

Etiologic and diagnostic studies in 82 consecutive cases

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Of the 82 cases presented, 31 were due to inflammations and 51 to noninflammatory conditions. Thirteen of the former were caused by abscesses. Twenty-four of the latter were consecutive to malignant neoplasms while ten followed benign growths. From the Department of Ophthalmology, College of Medicine, State University of Iowa.

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Unilateral exophthalmos is a striking symptom. Ordinarily it is due to orbital inflammation or to noninflammatory changes within the orbit, either of which may occur as a primary local disease, as an extension from disease in an adjoining area, as a metastatic lesion, or as a manifestation of a general or widespread pathologic state. Usually the cause of the proptosis is easily determined but oftentimes it is obscure and is disclosed only after tissue examination.

In 82 consecutive cases of unilateral exophthalmos there were 31 of the inflammatory type and 51 of a noninflammatory nature.

Orbital Inflammation (31 cases)

Inflammation of the orbit, occurring in the soft tissues, bones, or periosteum, was invariably due to one of three causes: extension from an adjoining area of inflammation, injury with infection, or metastasis from a distant inflammatory focus. As a rule diagnosis was not difficult, since, in addition to rapidly progressive proptosis, there were other symptoms and signs of inflammation; e.g., orbital pain and tenderness, redness and swelling of the eyelids, limited and perhaps painful ocular movements, chemosis of the bulbar conjunctiva, and in some cases elevation of temperature and leukocytosis.

Abscess—*extension from suppurative sinusitis (13 cases).* Orbital abscess, with proptosis of the globe, appeared most frequently as a complication of acute or chronic suppurative inflammation of the sinuses. Extension from the purulent sinus into the orbit usually followed osteomyelitis with dehiscences in the bony wall separating the two cavities. In older children and adults the infection invariably extended from the frontal sinus (fig. 1), while in infants and young children it originated in the ethmoid labyrinth (fig. 2). In three cases the abscess followed puncture or operation on the maxillary sinus, evidently as a result of accidental perforation of the orbital floor. Staphylococcus aureus was the usual infecting organism but pneumococcus was found in one case and streptococcus hemolyticus in another.

A history of colds and recurrent sinus infection was common, and headaches with pain and tenderness over the ocular region were frequent complaints. Diplopia was often present. Proptosis, with redness and edema of the lids developed rapidly; ocular rotations were limited and the bulbar conjunctiva was red and chemotic. Roentgenograms revealed clouded sinuses and, in most cases, dehiscences in the roof or medial wall of the orbit. Other findings were encountered more rarely; e.g., lateral or downward displacement of the globe, a solid or fluctuating tumor mass at the medial side or in the upper nasal quadrant of the orbit, a discharging sinus in the lid or conjunctiva, and congestion and edema of the nerve head and retina.

In two patients the orbital abscess recurred, although both had apparently healed after orbital drainage and sinus operations. Recurrence was the result of failure to remove a sequestrum of bone in one patient, and persistent infection of an incompletely obliterated frontal sinus in the other.

Abscess—*following perforating injury (1 case).* Tenderness and swelling of the lids with rapidly increasing proptosis and limitation of ocular movements developed one week after a minor pene-

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 8

Fig. 1 (O'Brien and Leinfelder). Orbital abscess complicating an acute suppurative sinusitis.
Fig. 2 (O'Brien and Leinfelder). Orbital abscess complicating an acute suppurative ethmoiditis.
Fig. 3 (O'Brien and Leinfelder). Orbital abscess following perforation of lower lid with splinter of wood.
Fig. 4 (O'Brien and Leinfelder). Epidermoid carcinoma of conjunctiva with extension into orbit.
Fig. 5 (O'Brien and Leinfelder). Epidermoid carcinoma of skin with extension into orbit.
Fig. 6 (O'Brien and Leinfelder). Primary fibrosarcoma of orbit.
Fig. 7 (O'Brien and Leinfelder). Lymphoma of conjunctiva and orbit in myelogenous leukemia.
Fig. 8 (O'Brien and Leinfelder). Acute lymphatic leukemia with lymphoma of orbit.

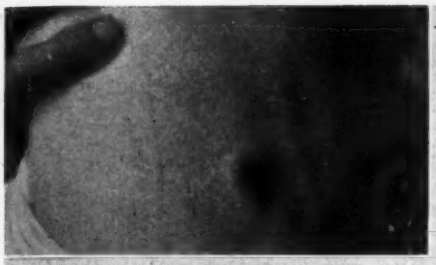

FIG. 9

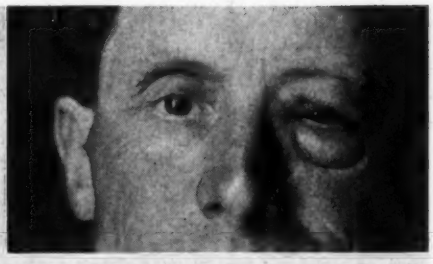

FIG. 10

FIG. 11

FIG. 12

FIG. 13

FIG. 14

Fig. 9 (O'Brien and Leinfelder). Acute lymphatic leukemia with lymphoma of skin.
Fig. 10 (O'Brien and Leinfelder). Malignant lymphoma of the lower eyelid and orbit.
Fig. 11 (O'Brien and Leinfelder). Meningioma of sphenoid ridge with extension into orbit.
Fig. 12 (O'Brien and Leinfelder). Chondromyxoma of orbit and sinuses.
Fig. 13 (O'Brien and Leinfelder). Cavernous hemangioma of orbit and fornix.
Fig. 14 (O'Brien and Leinfelder). Mucocele of frontal sinus.

trating injury of the lower eyelid. Examination three weeks after the accident revealed poor vision, red and swollen lids, and a globe displaced forward, laterally, and downward. There was a hard palpable mass in the nasal portion of the orbit. The fundus was normal. Roentgenograms failed to show a foreign body but there was increased density of the orbit; the sinuses appeared normal. The patient had a temperature of 106.2° F. and there were 16,000 white blood cells. The orbital abscess was drained through the lower lid and a large amount of greenish pus removed. Staphylococcus hemolyticus was grown on culture. The proptosis persisted, the temperature remained elevated for six weeks, and complete optic atrophy developed. Orbital drainage was established on two other occasions but healing occurred only after a small piece of wood was expelled through the draining sinus (fig. 3).

Abscess—*actinomycosis (1 case).* Proptosis as a result of orbital infection with actinomyces bovis is a rare condition.

A male, 30 years of age, entered the hospital on account of a discharging sinus of the left cheek and ankylosis of the jaw over a period of six months,

and proptosis of the left eyeball for six weeks. Repeated operations had failed to effect a cure. When seen in consultation there was pronounced proptosis but the globe was otherwise normal. Symptoms and signs of general infection developed and the proptosis increased. After six weeks a neurological diagnosis of tumor of the left sphenoid ridge was made because of paralysis of the left abducens nerve and oncoming coma, but at operation no gross intracranial pathology was found. A few days after the operation signs of orbital inflammation developed. Roentgenograms of the skull revealed areas suggestive of osteomyelitis. The patient rapidly became worse and developed a right-sided hemiplegia, loss of speech, and coma. Death occurred and at necropsy there was found a cavernous-sinus thrombosis with extension into the left internal jugular vein, multiple brain abscesses, chronic suppurative encephalitis, and acute suppurative leptomeningitis. Actinomyces bovis was cultured from the brain.

Cellulitis—*complicating panophthalmitis (11 cases).* Proptosis of the eyeball invariably accompanied advanced panophthalmitis. In nine cases the ocular inflammation was due to injury or corneal ulceration with perforation and presented the usual symptoms and signs.

In one patient infection with staphylococcus aureus followed an operation for convergent strabismus. Three days after recession of the medial rectus muscle, an abscess was noted at the site of the scleral suture; there was gradual extension, followed by panophthalmitis and orbital cellulitis.

Another patient, an elderly man, was admitted on account of impaired vision, pain, swollen lids, and proptosis of the eyeball over a period of two weeks. There was no history of ocular injury, but both hands and arms had been severely burned two months previously, and infection with ulceration had followed the injury. The panophthalmitis in this case was evidently metastatic, since staphylococcus aureus was cultured from the ulcers on the arms and also from the suppurative vitreous.

Cellulitis—*complicating cavernous-sinus thrombophlebitis (2 cases).* Proptosis in cavernous-sinus thrombosis is due to extension forward from the inflammatory process in the sinus and is usually bilateral; however, in two patients the orbital and ocular symptoms and signs were unilateral.

One patient was admitted with pain over the right ocular region and rapidly developing proptosis of the globe of two days' duration. He was extremely ill; the temperature was 104.6° F., and the white-blood-cell count was 16,400. A diagnosis of acute suppurative maxillary sinusitis and cellulitis of the face was made, and the sinus was opened immediately. When seen in consultation a few hours later, there was considerable swelling of the lids with extreme proptosis and immobility of the globe; the bulbar conjunctiva was chemotic, the pupillary reactions sluggish, and signs of edema were present in the nerve head and retina. The opposite eye was normal and remained so until death occurred a few hours later. The diagnosis of cavernous-sinus thrombosis with extension into the right orbit was confirmed at necropsy.

In the other patient, rapidly developing proptosis of one eyeball, typical symptoms and signs of orbital inflammation, sluggish pupillary reactions, and edema of the nerve head appeared two days after a mastoid operation and the removal of a clot from the lateral sinus. Just before death, which occurred sixteen hours after the appearance of proptosis, there were early signs of inflammation in the other orbit.

Cavernous-sinus thrombosis must be considered in any patient with an acute illness, in whom there is an elevation of temperature, leukocytosis, signs of fulminating orbital inflammation on one or both sides, sluggish pupillary reactions, and evidences of papilledema. Acute sinus disease and facial erysipelas may present somewhat similar pictures.

Osteomyelitis (2 cases). Inflammation of the bones of the orbit is usually due to syphilis, tuberculosis, or extension from purulent sinus disease. In each of our cases there was a history

of chronic inflammation of the orbit in infancy, which may or may not have been tuberculous; the Wassermann reacitions were negative and there was no evidence of sinus disease. The cause was undetermined since the lesions had been healed for a number of years. Proptosis was present, there were old retracted scars in the lids and roentgenograms revealed destruction of bone.

Periostitis (1 case). A young man was admitted to the hospital with a history of meningitis, followed by recurrent edema of the eyelids and the development of a chronic discharging sinus in the lid. Examination revealed an old purulent sinus at the nasal side of the left upper lid which extended backward to the bony roof of the orbit. Proptosis was present and there was a divergent strabismus. Staphylococcus aureus and streptococcus hemolyticus were cultured from the purulent discharge in the sinus. Roentgenograms of the orbit showed no bone pathology and it was believed the inflammation was situated in the periosteum.

Noninflammatory Orbital Changes (51 cases)

Noninflammatory changes in the orbit, with associated unilateral proptosis, were most frequently due to malignant neoplasms, either primary, secondary, or metastatic. Benign neoplasms were less frequent. In some cases the proptosis resulted from trauma and in a few instances from miscellaneous causes. As a rule, exophthalmos developed slowly, no signs of inflammation being present, although edema and hemorrhages in the lids occurred; often a visible or palpable mass was found in the orbit; frequently the globe was displaced laterally or vertically; and the ocular rotations were limited in one or more directions. The history, careful examinations, and roentgenograms led to a diagnosis in several cases, but tissue examination was usually necessary.

Malignant neoplasms (24 cases)

Carcinoma (9 cases). Primary carcinoma occurred in two patients, in each of whom the tumor originated in the conjunctiva and extended backward into the orbit (fig. 4). Secondary tumor followed extension into the orbit from a primary neoplasm of the antrum in three cases, and in one case extension was from the skin (fig. 5). Three metastatic tumors were encountered, two from the breast, and one by extension of a metastatic growth in the brain, which arose from a primary neoplasm of the stomach. The six primary tumors of the head regions were epidermoid carcinomata and the three metastatic tumors were adenocarcinomata. With one exception, that of the primary gastric carcinoma, the neoplasms appeared in persons over 40 years of age. The development of these tumors was comparatively slow. In addition to proptosis of the globe, the tumors of the antrum gave rise to pain, unilateral nasal obstruction, swelling of the side of the face, limitation of ocular rotations, cervical glandular enlargements, and roentgenographic evidence of bone destruction in the orbit, antrum, and other contiguous structures. In each of the two cases of primary breast tumor there was a history of breast amputation, and roentgenograms showed defects in the bony orbit and skull.

The patient with adenocarcinoma of the stomach and brain metastasis was of especial interest. A young man, 22 years of age, entered the hospital on account of abdominal pain, loss of weight and strength, bleeding from the intestinal tract, and secondary anemia. Prior to admission the appendix had been removed, without relief from symptoms; also several teeth had been extracted, followed by persistent pain and swelling of the right side of the face. This young man was extremely ill, bled constantly from the intestinal tract, and had a severe secondary anemia. When seen in consultation there was swelling in the region of the right zygoma, proptosis of the globe, a soft, tender, edematous upper eyelid, pseudoptosis, and engorged retinal veins. Roentgenograms and fluoroscopic studies revealed a duodenal deformity but gastric studies were not completed on account of the general condition of the

patient. Death occurred after a few weeks and at necropsy an adenocarcinoma of the stomach was found; there was a metastatic tumor of the right temporal lobe of the brain which had eroded through the lateral orbital wall into the orbit and through the temporal bone into the temporal fossa.

Sarcoma (8 cases). Five of these tumors were primary in the orbit (fig. 6), and three were metastatic, two from primary neoplasms in the tibia and one from a retroperitoneal growth. With one exception they occurred in children between the ages of 2 and 12 years and were fibrosarcomata; the one exception was a primary undifferentiated round-cell sarcoma, which may have been lymphosarcoma, in an elderly man. These tumors were comparatively rapid in growth and usually the exophthalmos had been present for only two or three months. As a rule there was a visible or palpable mass within the orbit. Proptosis varied in degree, limitation of ocular movement was common, and in three cases the lids were edematous and hemorrhagic, as might be expected with sarcoma. In two of the children the optic nerve was atrophic and in one there was a choked disc. The preauricular or cervical glands were enlarged in only two cases, the regional lymph nodes not being involved as in carcinoma. Roentgenograms showed invasion of bone in four cases. In the two children in whom the orbital growth was metastatic from the tibia, there were also metastases to the lungs.

Neoplastic diseases of the hematopoietic system (7 cases). Proptosis was found in association with four types of neoplastic or hyperplastic disease of the blood-forming tissues. There were two cases of undifferentiated hematopoietic tumor, two of myelogenous leukemia, one of acute leukemia, and two of malignant lymphoma.

Both cases of *undifferentiated hematopoietic tumor* occurred in children; in each there was rapidly advancing exophthalmos and a palpable nodular mass in the orbit. The lids were edematous, ocular rotations were limited, and there was edema of the nerve head. General examinations were of no assistance and the blood pictures were normal. In one patient, roentgenograms showed a small area of rarefaction in one tibia but in the other all the bones were normal. The diagnosis was made, in each case, from tissue examination.

Myelogenous leukemia with unilateral exophthalmos occurred in two cases. In one young man there was proptosis of the globe, limitation of ocular rotations, swelling of the face on the same side, general pallor, ulcers of the buccal mucosa, enlargement of the spleen, liver, and cervical glands, a red-blood-cell count of 3,120,000 and a white-blood-cell count of 127,000 with a preponderance of premyelocytes and myelocytes. The diagnosis was confirmed at necropsy. The other case was that of a man, aged 41 years, who had proptosis of the globe, conjunctival lymphoma, an enlarged spleen, a red-blood-cell count of 4,360,000 and a white-blood-cell count of 193,600 with a preponderance of myelocytes (fig. 7).

Acute leukemia, probably of the lymphoblastic type, was seen in a two-year-old child. Extreme proptosis (fig. 8) was present and the side of the face and the lids were swollen. The child was extremely ill; several large purple nodules were present in the skin (fig. 9); the abdomen contained a large palpable mass; and the white-blood counts varied between 35,000 and 100,000 cells. Death occurred within a few days and at necropsy there was found lymphomatous infiltration of the lacrimal gland, skin, pancreas, and kidneys.

Malignant lymphoma, a type of sarcoma due to hyperplasia of lymphoid tissue, occurred in two patients. In a man 46 years of age the symptoms and signs were confined to one orbit; i.e., proptosis and a doughy mass in the orbit and lower eyelid (fig. 10). No other pathology was found on general examination and the blood picture was normal at all times. Microscopic diagnosis of the tumor tissue was malignant lymphoma. The other patient, a man 60 years of age, had unilateral proptosis, ptosis, paralysis of the third cranial nerve, and optic atrophy. General ex-

amination revealed no other pathology and the blood was normal. Microscopic diagnosis was malignant lymphoma of the endothelial type.

Benign neoplasms (10 cases)

Meningioma (4 cases). Proptosis appeared in four elderly patients as a result of extension of a meningioma into the orbit; in three cases the extension was from a primary tumor of the sphenoid ridge, and in the other from a primary suprasellar growth. Diagnosis was made from roentgenograms in all four cases; in two it was confirmed at operation. These tumors were of extremely slow growth and the proptosis had progressed gradually over a period of many years. In the early stages no other symptoms nor signs were present. Ocular rotations were limited, and vision in the affected eye was poor as a result of edema or atrophy of the optic nerve. Roentgenograms revealed hyperostoses and a partially calcified intracranial growth; in three cases there were visible extensions into the orbit (fig. 11).

Glioma of the optic nerve (1 case). In a child, six years of age, exophthalmos and poor vision had existed for six weeks. The lids were slightly edematous, a paralytic convergent strabismus was present, ocular rotations were limited temporally, and the nerve head was edematous. A preoperative diagnosis of glioma of the nerve was confirmed by microscopic examination after removal of the tumor. The neoplasm extended from a point 1 cm. back of the globe to the optic foramen.

Adamantinoma (1 case). This rare tumor, arising from embryonal tooth elements, occurred in a seven-year-old child. There was a history of edematous eyelids over a period of six weeks, and gradually increasing proptosis for seven days. On admission the lids were edematous, there was pronounced exophthalmos with lateral and upward displacement of the globe, and upward rotations were limited. A firm tumor mass extended from the area of the medial canthal ligament backwards into the orbit. Roentgenograms showed extensive bone destruction at the nasal margin of the orbit, with probable extension into the greater wing of the sphenoid. From tissue obtained at biopsy, a microscopic diagnosis of adamantinoma was made. No clinical nor roentgenographic evidences of dental anomalies or disease were found.

Chondromyxoma (1 case). Unilateral proptosis, nasal obstruction on the same side, and recurrent epistaxis over a period of eight or ten months occurred in an elderly woman. On admission, the entire side of the face was swollen and the eyeball was displaced forward, upward, and laterally; rotations were limited in all directions and there was a palpable tumor mass in the lower portion of the orbit. There was a firm easily bleeding mass in the nose which apparently extended into all the sinuses of the right side. Roentgenograms showed a destructive process involving the right orbit and sinuses. From a piece of the gelatinous tumor mass a microscopic diagnosis of chondromyxoma was made (fig. 12).

Cavernous hemangioma (1 case). A cavernous angioma of the upper eyelid and orbit, with associated proptosis and downward displacement of the globe, was seen in an infant 4 months of age. The tumor had been present since birth and was enlarging slowly. On eversion of the lid, a bluish nodular mass was visible in the upper fornix; it was soft and compressible, almost disappearing on digital pressure but greatly increasing in size when the child cried (fig. 13).

Neurofibroma (1 case). This tumor was encountered in a middle-aged woman who entered the hospital on account of attacks of ocular pain and gradually increasing proptosis over a period of three years. The globe was displaced forward and downward, there was diplopia on extreme right rotation, convergence was poor, and the veins of the bulbar conjunctiva were slightly engorged. Roentgenograms failed to show any disturbance in the orbit. Nothing was found on general examination, and the Wassermann reaction was negative. The pain became so se-

vere that an operation was made; a large tumor of the frontal nerve was removed from the posterior portion of the orbit. The microscopic diagnosis was neurofibroma.

Pseudotumor or *granuloma (1 case).* Granulation-tissue tumor or pseudotumor of the orbit is rare and the etiology as yet unexplained. This case is especially interesting since it was associated with indefinite general symptoms and, after a few months, with a similar change in the orbit of the opposite side.

A male, 64 years of age, was admitted on account of unilateral proptosis and diminution in vision over a period of three months. At examination there was pronounced exophthalmos, a widened palpebral fissure, limitation of ocular rotations temporally and downward, and chemosis of the conjunctiva. Repeated general examinations failed to elicit anything of pathologic interest except diabetes insipidus. The Wassermann reaction was negative. At operation there was found a large, hard, nonencapsulated, yellow tumor mass which occupied the entire temporal orbit and partially surrounded the optic nerve. The tissue was diagnosed independently by three pathologists of national prominence as granuloma: Although there was no recurrence, after a few months the opposite eyeball gradually became prominent. Upon readmission to the hospital, six months later, there was extreme proptosis of the opposite globe, with a palpable tumor mass near the lateral canthus which extended backwards into the orbit. The general condition of the patient was poor, there were indefinite gastric complaints and other symptoms but the internists were unable to make a diagnosis. At his own request the patient was allowed to return to his home where he died within a short time. A necropsy was not allowed.

Mucocele of the frontal sinus (3 cases). Chronic inflammation and gradual enlargement of the frontal sinus, with erosion into but no inflammation of the orbit, accounted for three cases of unilateral proptosis. There were no signs of orbital inflammation and the exophthalmos developed slowly. In each case the globe was displaced forward, downward, and laterally, and ocular rotations were limited nasally. In two patients there was a palpable fluctuating mass at the medial side of the orbit, which extended upward and laterally under the superior orbital margin; in the other there was no visible nor palpable mass. Roentgenograms revealed defects in the orbital roof in each case (fig. 14).

Mucocele must be differentiated from orbital neoplasms; usually there is nasal pathology, roentgenograms show destruction of the bone separating the sinus and orbit, and on aspiration a mucoid or mucopurulent material is recovered from the tumor mass.

Trauma (8 cases)

Hematoma (4 cases). In three cases the hematoma was the result of blunt injury and in the other it followed perforation of a vessel during a retrobulbar injection. The proptosis appeared immediately in every case and regressed slowly over a period of days.

Arteriovenous aneurysm; pulsating exophthalmos (3 cases). There was a history of head injury in each of the three cases of pulsating exophthalmos. The usual signs of proptosis, bruit over the ocular region, coarse congestion of the conjunctival and episcleral veins, sluggish pupil, and retinal congestion and edema were present.

Emphysema (1 case). In one patient unilateral proptosis with swelling and crepitation of the lids developed immediately after an injury with a golf ball.

Metabolic diseases (2 cases)

Exophthalmic goitre (2 cases). Unilateral exophthalmos was seen in two cases of hyperthyroidism. The other ocular signs of the disease were bilateral.

Unilateral axial myopia (1 case). In one patient unilateral axial myopia of high degree resulted in pronounced prominence of the globe. This condition, really a pseudoproptosis, must be considered in the differential diagnosis of unilateral exophthalmos.

Undiagnosed (3 cases). A clinical diagnosis of sarcoma was made in a child, 5 years of age, who was seen on ac-

count of rapidly developing exophthalmos. A palpable mass was present in the superior nasal quadrant of the orbit and roentgenograms revealed a large orbital tumor with invasion of bone. Biopsy and operation were refused.

Orbital tumor was believed to be present in a man, 32 years of age, who was seen on account of headaches and gradually increasing proptosis over a period of four years. Aside from pronounced exophthalmos the globe and adnexa appeared normal; general examination and roentgenograms failed to reveal the cause of the proptosis and the Wassermann reaction was negative. Further study was impossible since the patient refused to remain in the hospital.

A woman, 43 years of age, was seen repeatedly, over a period of four years, on account of headaches, ocular pain, and proptosis of the globe. An incomplete exploration of the orbit failed to reveal any cause for the condition. X-ray therapy was employed and the proptosis decreased slightly but the pain continued. Recently a thorough exploration of the orbit was made but no tumor was found and the cause of the proptosis and pain remains obscure.

Discussion and Summary

In a series of 82 consecutive cases of unilateral exophthalmos 31 (38 percent) were due to orbital inflammation and 51 (62 percent) were the result of noninflammatory changes.

Orbital inflammation.—Abscess in the orbit occurred as a complication of suppurative sinusitis in 13 cases, followed a perforating injury in 1 case, and was associated with actinomycosis in 1 case. Cellulitis was seen as a complication of panophthalmitis in 11 cases, and with cavernous-sinus thrombosis in 2 cases. There were 2 cases of osteomyelitis and 1 of periostitis.

Inflammatory conditions usually were recognized with ease since the symptoms and signs were sudden in onset and progressed rapidly. Proptosis increased rapidly from day to day, movements of the globe were limited, and pain and tenderness were present. The lids were red and swollen, the bulbar conjunctiva was congested and chemotic, and occasionally a fluctuating mass was seen or felt in the orbit. A discharging sinus appeared in the lid or conjunctiva in 2 cases. Rarely were there signs of congestion in the fundus. In some cases the temperature was elevated and there was an increased white-blood-cell count. Careful examination of the nasal accessory sinuses, teeth, and other regions of the head together with roentgenographic studies usually revealed the source of infection, although in one instance it was situated in a distant focus.

Orbital changes of a noninflammatory nature.—Malignant neoplasms, either primary, secondary, or metastatic, were present in the orbit in 24 cases and constituted the most frequent cause of unilateral exophthalmos. Sarcoma was usually primary in the orbit but also occurred as a metastatic growth; with one exception it was found in children, grew rather rapidly, and often infiltrated bone. Carcinoma, as a rule, entered the orbit by extension from the antrum, skin, or other adjoining parts, but also occurred as a metastatic growth; it was seen only in adults, grew quite slowly, involved the regional lymph nodes, and infiltrated bone in some cases. Neoplastic diseases of the hematopoietic tissues were responsible for several orbital tumors; i.e., undifferentiated hematopoietic tumors composed of cells of an early embryonal type, malignant lymphomas, in association with myelogenous leukemia, and as one of the manifestations of acute leukemia. Blood studies were a means to diagnosis in some cases of this type but not in others.

Benign neoplasms were found in 10 cases. Meningioma occurred most frequently; the tumor grew very slowly and gave rise to few symptoms, except in the late stages; in the roentgenograms there were evidences of hyperostoses in the anterior or middle cranial fossa or in the orbit. Other tumors were encountered; e.g., glioma of the optic nerve, granuloma, hemangioma, neurofibroma, adamantinoma, and chondromyxoma.

Trauma followed by orbital hema-

toma, rupture of the carotid artery into the cavernous sinus with pulsating exophthalmos, or orbital emphysema occurred in 8 cases. In orbital hemorrhage the proptosis developed rapidly and subsided slowly without other symtoms; in arteriovenous aneurysm the typical signs of pulsating exophthalmos were present; in emphysema the onset was sudden and crepitation was elicited in the lids.

Mucocele of the frontal sinus was present in 3 cases; the proptosis developed slowly and the globe was displaced laterally and downward.

Exophthalmic goitre occurred twice; the proptosis was unilateral but the other common ocular signs were present in both eyes. A high degree of unilateral axial myopia with pseudoproptosis was seen in 1 patient.

In 3 cases the etiology was undetermined.

Noninflammatory lesions of the orbit, accompanied by proptosis, were sometimes difficult of diagnosis and often tissue examination was necessary in order to establish the etiology. The history was of importance, especially in cases of trauma or metastatic tumor. Signs of inflammation were absent although pain was sometimes present and occasionally the lids were edematous or even hemorrhagic. Frequently a visible or palpable mass was detected in the orbit, and often the globe was displaced laterally or vertically as well as forward. Ocular rotations were usually limited in one or more directions. Roentgenograms were of assistance in many cases; they failed to show evidence of a tumor mass at times, but frequently, even though the tumor was not outlined, there were signs of pressure, bone infiltration, bone erosion, or hyperostoses. A general physical examination, including blood and other laboratory studies, should always be made, since in a few cases it was the sole means of diagnosis.

STUDIES ON THE INFECTIVITY OF TRACHOMA

III. On the Filterability of the Infectious Agent of Trachoma

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A study has been made of the filterability of the infectious agent of trachoma. Human trachomatous material from 50 patients was studied under different conditions of filtration. Of these tissues, 41 were found to be infectious for monkeys. In the unfiltered state, the human material induced formation of follicles in 33 of 41 monkeys inoculated. Of 44 monkeys inoculated with filtrates of the same tissues, only three were infected, and these all in one experiment. A large number of animals unaffected by inoculation of filtrates of active material were subsequently infected with whole material, thus indicating that lack of infection in the first instance was not due to a high degree of resistance in the animals studied.

Further attempts to demonstrate filterability of the trachomatous agent were made by injecting filtrates of active material into Swiss mice and rabbits. The results were uniformly negative.

The indications from this study are, therefore, that the agent of trachoma is not readily filterable, and that rather than being a filterable virus, it is a small organism capable, under conditions at present unknown, of traversing a filter. From the bacteriological laboratories of the Oscar Johnson Institute, Washington University School of Medicine, Saint Louis, Missouri. The entire work was conducted under a grant from the Commonwealth Fund of New York City.

That the causative agent of trachoma may be a filterable virus was first reported by Bertarelli and Cechetto[1] and Morangiu[2]. Later Nicolle[3] and his coworkers published a long series of communications in which they described numerous detailed experiments, the results of which indicated that trachomatous tissues contain a filterable agent capable of transmitting trachoma. More recently Cattaneo[4] also found filtrates of the human tissue to be infectious. On the other hand, the experiments of several investigators[5–13] failed to demonstrate the filterability of the infectious agent of trachoma.

While pursuing an intensive study on the etiology of trachoma in this laboratory, it was established[13] that trachomatous tissues are infectious for monkeys. The infection induced in monkeys appears to be specific[14, 15] of trachoma, despite differences in clinical appearance between the natural and experimental diseases. It was found, moreover, that the experimental infection occurs independently of trachoma "inclusions"[13] or defective diet, particularly vitamin-A deficiency[16]. With these two conditions apparently eliminated as possible etiological factors, it was proposed to determine the infectivity of filtrates of trachomatous tissues. The results of this study are being reported at the present time.

Experimental

The human tissue employed in this study was obtained entirely through Dr. C. E. Rice at the U. S. Trachoma Hospital at Rolla, Missouri. The conjunctival material was collected from patients of unquestionable diagnosis whose date of onset of trachoma varied from a few weeks to a few months. Grattage was performed on all the patients and the scrapings from all four lids were gathered in 1.5 c.c. sterile salt solution. The material was used either the same day, several hours later, or preserved in the ice-chest until the following day. Tissues otherwise untreated were found to be equally effective in infecting monkeys under either circumstance.

The conjunctival scrapings from several patients were usually pooled and then ground in a sterile mortar, sometimes with and sometimes without sand. The ground material was then divided so that a sufficient portion was available later for inoculation of monkeys, and the remainder was used for filtration. In most instances it was found necessary to dilute the trachomatous material with salt solution or with veal infusion broth (pH 7.8) before filtering, in which case the reserved whole portion was diluted to the same proportion. At first, the filtering of such small quantities was attended by a relatively great

loss of material. This was eventually circumvented later in the study by adopting the following technic, after being assured that no source of error was being introduced. Melted paraffin was poured into the jacket until it came to the top of the ferrule at the bottom of each filter and allowed to harden. It is important to mention at this point the observations of Holman[17]. He showed that paraffin and oil increase the permeability of a filter. Since the trachomatous agent was unable to traverse a filter, as will be brought out later, it is obvious that this modification does not invalidate any of the data. In some cases, a sterile rubber stall was unrolled over the top of the filter until only as much surface of the filter as was desired was left exposed. In other instances no rubber stall was used, in which case the material was applied at the top of the filter by means of a capillary pipette. No differences, however, were noted in the results obtained with either method. Filtration was then carried out in the usual manner, and suction was supplied by running water.

In each case a record was kept of the pressure used and the length of time required for the filtration. Scrapings from the conjunctiva always contain blood, and, as was to be expected, the filtrates were usually water clear, while the filters themselves were definitely blood stained.

Seedings of the filtrates were made on horse blood, sugar agar[18], rabbit-blood agar without sugar, and semi-solid-leptospira agar, with inocula of 0.2 to 0.5 c.c. Cultures were incubated at 30°C. and 37°C. and were observed for 7 to 10 days before they were considered negative. Inoculations were made with unfiltered material in monkeys, and with filtered material not only in monkeys but in many instances in rabbits. In monkeys, the materials were either swabbed over the surface of the conjunctiva or injected subconjunctivally in 0.1 c.c. or 0.2 c.c. quantities. Usually, however, both methods were applied, one to one eye and the other in the second eye. In any case, tissues from the same patients, filtered and unfiltered, were inoculated in animals in the same concentration and by the same technic. Each rabbit was inoculated in three places; intratesticularly, intracutaneously, and pericorneally, by multiple scarification and instillation of the filtrate in the conjunctival sac. The quantities inoculated in rabbits varied from 0.2 c.c. to 0.5 c.c.

The animals were then examined routinely about once a week or oftener and were kept under observation for a month to six weeks before they were discarded as failing to become infected.

Analysis of data on filterability of the infectious agent of trachoma. A summary of all the experiments with filtrates of trachomatous tissues is given in table 1. A total of 14 individual experiments was completed covering a period of two years. Material from 50 cases of trachoma was studied, of which 41 were of demonstrated infectivity. In one experiment, using tissues from two patients, 3 monkeys inoculated with un-

Table 1

SUMMARY OF EXPERIMENTS ON INFECTIVITY OF FILTRATES OF TRACHOMATOUS TISSUES IN MONKEYS

Number of Successful Experiments	Number of Infectious Tissues	Number of Monkeys					
		Inoculated with Material		Infected with Material		Infected with Whole Material	
		Unfiltered	Filtered	Unfiltered	Filtered	Before Filtration	After Experiment
11	41	41	44	33	3*	13	22**

* These animals were infected in a single experiment (cf. table 3).

** Of this group, 4 animals were infected successfully before as well as after inoculation of filtered material. Fourteen experiments were done in all; in 3, unfiltered material was either inactive or untested. A total of 50 tissues was studied but infectivity was proved in 41.

filtered material failed to show any sign of infection; and in a second experiment, using tissues from four patients, neither of 2 monkeys was infected by the inoculation of unfiltered material. In a third experiment, the unfiltered material from three patients was not inoculated. The tissues were filtered undiluted in three experiments or diluted as much as four times in the remainder. Dilution was made with broth in four experiments and with saline in seven experiments. Filtration was effected in general with Berkefeld V filters; no observations were made with asbestos or plaster-of-paris[10] filters. The time required for filtration varied from 8 to 30 minutes and the pressure from 15 inches to 27 inches Hg. In four of the experiments, the filters were prepared for filtration by the rubber-stall and paraffin modification, as described above. Cultures of the filtrates yielded no growth on 12 occasions. In two instances, growth appeared once (exp. 4) in leptospira agar as a short gram-negative rod, and once (exp. 9) on rabbit blood agar only, as a Staphylococcus. It was not possible to classify the gram-negative rod; it did not agglutinate in anti-Bact. granulosis serum; and pure cultures of the organism failed to induce any reaction in the conjunctiva of monkeys, although inoculations were practiced several times. While both organisms cultivated were probably adventitious, the important fact is that neither affected the results of the experiments in any measurable way.

In the 11 experiments in which the tissues studied were of demonstrated potency, unfiltered material was inoculated into 41 monkeys, and of these 33 were infected. In 10 of the 11 experiments, the filtrates failed to infect any of 41 animals inoculated. In the remaining experiment, the filtrate was found to be infectious and this will be described in detail later.

In order to illustrate the methods employed and the results obtained in the study on the infectivity of filtrates of trachomatous tissues, a summary is given in table 2 of six typical experiments. A study of this proctocol shows that the number of tissues pooled for any single test varied from two to seven. Filtration was accomplished with a Berkefeld V filter, with material undiluted or diluted as many as three times with broth or salt solution. The pressure exerted in the filtration ranged from 15 to 27 inches Hg, and the time required for filtration varied from eight to 30 minutes. Except for the two cases already noted, inoculation of filtrates in different culture media yielded no growth. With inoculations of unfiltered and filtered material, performed in the same manner, a large proportion of monkeys was infected with whole material, in contrast with none infected with the filtrates. None of the rabbits inoculated evidenced any sign of infection. It is shown in this protocol, therefore, that the filtrates used failed to infect either monkeys by conjunctival inoculations or rabbits by intracutaneous, intratesticular, and pericorneal introduction of material.

That the animals used for inoculation of filtrates were not resistant to infection by trachomatous tissue is also demonstrated by the data in table 1. In some of the animals, susceptibility was proved before, some after, and in others both before and after inoculation of filtrates. Thus, it is seen that 13 animals subsequently inoculated with filtered material were infected previously with unfiltered tissues, and 22 animals were infected after completion of the filtration experiment. Four animals represented in each group were infected with trachomatous tissue both before and after inoculation of filtrates. Greater detail is given in the experiments described in table 2. The interval between injections of filtrate and unfiltered material vary considerably, and it is obvious that this factor plays little if any part in the success or failure of an infection.

In one experiment (no. 7), the filtrate of material pooled from two cases was found to be infectious for monkeys. This experiment is given in table 3. It will be observed that there was no particular difference or variation in the technic of filtration. The usual cultures of the filtrates were negative, and unfortunately, perhaps, no rabbits were

Table 2

INFECTIVITY OF FILTRATES OF TRACHOMATOUS TISSUES FOR MONKEYS. SIX TYPICAL EXPERIMENTS.

Experiment	Number of Tissues Pooled	Filtration	Culture of Filtrates	Method of Inoculation	Infectivity of Unfiltered Tissues (Monkeys)	Infectivity of Filtrates		Susceptibility to Infection of Monkeys in Filtrate Experiment	
						Monkeys	Rabbits	Before	After
No. 2	7	Undiluted Berkefeld V	No growth	O.S. injection	4 All infected	4 None infected	4	None tested	All 4 infected 9 months later
No. 3	2	Diluted 3 times with broth. Berkefeld V, 15 min., 15″ Hg	No growth	O.U. injection	3 2 infected	2 None infected	3	None tested	Both infected, one 10, one 3 months later
No. 4	2	Diluted 1 time with broth. Berkefeld V, 15 min., 15″ Hg	Gram neg. rod	O.S. swab O.D. Inj.	4 All infected	4 None infected	3	2 tested, one infected to 1 month, other to 3 weeks before	3 tested, 3 infected, one 9, one 2, one 6½ months later
No. 9	4	Diluted 2 times with saline. Berkefeld V, 15 min., 15″ Hg	Staphylococcus	O.S. swab O.D. Inj.	4 3 infected	3 None infected	—	1 tested. Infected to 2½ months before	2 tested, 2 infected, one 4½, one 7 months later
No. 11	4	Undiluted Berkefeld V, 8 min., 15″ Hg	No growth	O.S. swab O.D. Inj.	2 1 infected	4 None infected	—	1 tested. Infected to 2½ months later	3 tested, 2 infected, one 5, one 6 months later
No. 13	5	Diluted 3 times with saline. Berkefeld V, 30 min., 27″ Hg	No growth	*Controls* 3 inj. 8 swab *Test* 4 inj. 3 swab.	11 10 infected	7 None infected	2	4 tested. All infected to 2 weeks to 8 months before	None tested

A total of 14 similar experiments was done. Except for one in which filtrate was infectious (vid. table 3) the experiments were negative. Concentration of filtered and unfiltered materials was adjusted to similar dilutions. In experiments No. 11 and No. 13, the rubber-stall, paraffin modification was used.

Table 3

DETAILED PROTOCOL OF SINGLE EXPERIMENT IN WHICH FILTRATE OF TRACHOMATOUS TISSUE WAS INFECTIOUS FOR MONKEYS

Experiment	Number of Tissues Pooled	Filtration	Culture of Filtrate	Monkeys* Inoculated with Result	Monkeys Infected with Trachomatous Tissue with Interval before or after Inoculation of Filtrate	
					Before	After
No.7	2	Diluted twice with saline. Berkefeld V, 10 min., 15" Hg	No growth	No. 8—infected	Up to 6 months before	Not tested
				No.25—infected	Up to 2 months before	Not tested
				No.35—infected	Not tested	Not tested
				No.16—not infected	Up to 6 weeks before	Not tested
				No.22—not infected	Injected, not infected	Infected 9 months later
				No.30—not infected	Up to 2 months before	Not infected 6 months later

* Of 6 monkeys inoculated with unfiltered material in a similar way (i.e., O.S. swab, O.D. injection) 5 became infected.

inoculated with the filtered material. Of six monkeys inoculated by swabbing the left eye and injecting the right eye subconjunctively with 0.2 c.c. three were infected. No differences were observable in incubation period, character, course, or duration of the disease in the animals inoculated with either unfiltered or filtered material, so that the infection following introduction of the filtrate was genuine and typical. Of the animals infected by the filtrate, two had been infected previously with unfiltered material, as had also two of three monkeys not infected by the filtrate. The one animal (no. 35) which was not tested before or after inoculation of the filtrate was infected by the filtrate.

A careful study of the data on this experiment and the remaining experiments fails to reveal the reason for the infectivity of this particular filtrate. It has not been possible to repeat the observation, yet it is definite that on this occasion the infectious agent demonstrable in trachomatous tissues was able to traverse a Berkefeld V filter. That no cultivable organism was present in the filtrate, suggests the integrity of the filter and the difficulty or impossibility at the present time to cultivate the infectious agent. Dilution with salt solution and filtration in the usual manner without the rubber-stall, paraffin modification indicates the absence of any effect by these two factors on the filterability.

Two further experiments correlated with the current study were attempted to determine whether the infectious agent of trachoma is separable and demonstrable by fractional centrifugation. While the whole material was infectious, it was not possible by this technic to obtain any further evidence on the nature of the infectious agent. It is realized that more experiments of this variety are desirable, and it is for this reason that no comment or opinion is expressed at the present time.

Repeated attempts to demonstrate a virus in trachomatous tissues were made by injection of human material in white mice. The mice were a special strain (Swiss mice) of demonstrated susceptibility to viruses in general. They were obtained from Dr. R. S. Muckenfuss who has used similar animals in demonstrating successfully the occurrence of a filterable virus in the St. Louis epidemic of encephalitis. It was not possible with these mice to show, however, that a virus is associated with trachoma.

Discussion

The current study was undertaken to determine whether the infectious agent of trachoma is filterable. The literature bearing on the subject has not only been contradictory, but confusing, because of the omission, in several instances, of proper controls, such as determination of the activity of the ma-

terial studied, and insufficient data on the technic of filtration. While a number of experiments in the past have been done on monkeys[1, 2, 3, 6, 7, 8], a still greater number have been performed on human volunteers[3, 4, 5, 8–12], and it is in the human subject particularly that filtrates have proved most frequently not to be infectious. The recent experiments reported by Lumbroso and Thygeson[11] on human subjects are particularly well detailed, and the evidence on filterability of the infectious agent of trachoma is decidedly negative.

The data reported in this communication confirm and amplify the evidence against filterability of the trachomatous agent. In order to avoid any further confusion in trachoma literature, the criterion for filterability accepted in this study is the passage of an infectious agent through a filter without great loss in infectivity. All the experiments were conducted on monkeys of demonstrated susceptibility to infection, and the coarsest Berkefeld filter was used in all the experiments. Furthermore, the use of salt solution or broth as a diluent and the modification employing paraffin are all conditions which should facilitate rather than retard filtration. Attempts to demonstrate any filterable agent at all, irrespective of its possible association with trachoma, were uniformly negative as measured by the more common methods of demonstrating virus in rabbits. Incidentally, mice particularly susceptible to filterable viruses were inoculated on different occasions without notable influence.

It is true that in one experiment during this study filtered material was found to be infectious for monkeys. Olitsky, Knutti, and Tyler[20] have also shown that in six experiments with human tissues, of 20 animals inoculated with filtrates, one was infected; while of 16 inoculated with unfiltered material, nine were infected. At the same time they showed that cultures of Bact. granulosis[20] are irregularly filterable, and imply without stating so, that the occasional infectivity of filtrates may be due to the irregular passage of Bact. granulosis through the filter.

The evidence submitted suggests that the agent of trachoma is not as a rule filterable. On rare occasions it may traverse a Berkefeld V filter and thereby render the filtrate infectious. It seems more likely, then, that rather than indicating the incitant of trachoma to be a filterable agent, the possibilities are that the agent is probably small and capable under conditions not yet understood of occasional filtration.

Summary and Conclusions

1. A study has been made of 50 human tissues to determine the filterability of the infectious agent of trachoma. Forty-one of the tissues were demonstrated to be infectious.

2. Of 41 monkeys inoculated with unfiltered material from infectious human trachoma, 33 animals became infected.

3. Of 44 monkeys inoculated with filtrates of the same tissue, 3 became infected, all in one experiment.

4. Susceptibility to infection was demonstrated in a sufficient number of monkeys which were not infected following inoculation with filtrates.

5. Filtrates of trachomatous material were not infectious for rabbits as tested by intracutaneous, intratesticular, and percorneal inoculation.

6. Trachomatous tissues had no effect on Swiss mice, which appear to have an exaggerated susceptibility to viruses.

7. This study indicates, therefore, that under the conditions stated, the infectious agent of trachoma is not readily filterable.

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References

[1] Bertarelli, E., and Cechetto, E. Centr. Bakt., 1908, pt. 1, Orig., v. 47, p. 432.
[2] Marongiu, L. Le Policlinico, 1908, v. 15, p. 805.
[3] Nicolle, C., Cuénod, A., and Blaizot, L. Compt. rend. Acad. d. Sci., 1911, v. 152, p. 1504; 1912, v. 155, p. 214; 1913, v. 156, p. 1177; Arch. de l'Inst. Pasteur de Tunis, 1913, v. 3, p. 177; 1926, v. 15, p. 240.
[4] Cattaneo, D. Rev. Internat. du Trachome, 1932, v. 9, p. 186.
[5] Pfeiffer, R., and Kuhnt, H. Ztschr. f. Augenh., 1905, v. 13, p. 321.

[6] Hess, C., and Römer, P. Arch. f. Augenh., 1906, v. 55, p. 1.
[7] Bajardi, P. Clin. Ocul., 1907, v. 8, p. 2719.
[8] Fermi, C., and Repetto, R. Berlin. klin. Wchnschr., 1907, v. 44, p. 1197.
[9] Szafnicki, M. Zentr. f. d. ges. Ophth., 1929, v. 21, p. 45.
[10] Trapesontzewa, C. Rev. Internat. du Trachome, 1930, v. 7, p. 65.
[11] Lumbroso, V., and Thygesson, P. Arch. de l'Inst. Pasteur de Tunis, 1933, v. 22, p. 178.
[12] Candian, F. L. Latenca Parmense, 1933, v. 5, p. 224.
[13] Julianelle, L. A., and Harrison, R. W. Amer. Jour. Ophth., 1934, v. 17, p. 1035.
[14] Harrison, R. W. Jour. Inf. Dis., in press.
[15] Julianelle, L. A. and Harrison, R. W. Amer. Jour. Ophth., 1934, v. 17, p. 1035.
[16] Hetler, R. A., and James, W. M. Amer. Jour. Ophth., 1934, v. 17, p. 1048.
[17] Holman, W. L. Jour. Lab. and Clin. Med., 1926, v. 12, p. 158.
[18] Noguchi, H. Jour. Exp. Med., 1928, v. 48, Supplement No. 2.
[19] Kramer, S. P. Jour. Inf. Dis., 1927, v. 40, p. 343.
[20] Olitsky, P. K., Knutti, R. E., and Tyler, J. R., 1931, v. 54, p. 557; also Science, 1931, v. 73, p. 709.

A CLINICAL OPHTHALMIC ERGOGRAPH*

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A simplified ophthalmic ergograph for the clinical study of fatigue of convergence and accommodation is described. The use of the instrument in the diagnosis and treatment of anomalies of convergence and accommodation is briefly outlined.

The author acknowledges his indebtedness to Howe's pioneer work in this field. Presented before the Section on Ophthalmology of the American Medical Association, at Cleveland, June 14, 1934.

The ergographs previously described were constructed primarily for research purposes[1, 2]. The instrument presented here, a combination of Howe's instrument for the study of convergence and accommodation, was constructed in the hope that other clinicians might find the study of fatigue of convergence and accommodation of interest and value in office and clinic practice.

Description of the Ergograph

A heavy metal base supports four metal uprights joined near their tops by two metal crosspieces (fig. 1). The anterior crossbar supports two projections which receive a wooden tongue depressor to be used as a mouth bite for fixing the head. A bar joining the centers of the anterior and posterior crosspieces supports a test-object carrier, into which may be inserted a small dot or line for studying fatigue of convergence, and fine, photographically reduced, reading test type for the study of fatigue of accommodation.

The test-object carrier is movable on the carriage, which is activated by a lever placed at the patient's right on the instrument. A hinged holder is attached to the carriage for a stylographic pen which writes the record of each effort of accommodation or convergence on a continuous roll of white paper. The

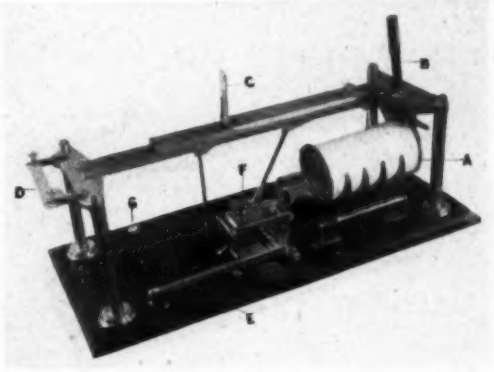

Fig. 1 (Berens). Clinical ophthalmic ergograph. A, drum; B, stylographic pen; C, test-object holder on movable carriage; D, tongue depressor; E, activating lever; F, speed mechanism; G, stop button.

* This study was aided by a grant from the Ophthalmological Foundation, Inc. For details of construction of the ergograph consult E. B. Meyrowitz, Inc., 520 Fifth Avenue, New York, N.Y.

drum which controls the movement of the white paper is activated by each backward motion of the carriage. A push button on the base of the instrument at the patient's left may be used for stopping the forward movement of the test object. A screw on the speed-adjusting mechanism permits the regulation of the speed of the carriage. A 50-watt daylight lamp at 50 cm. at an angle of 45 degrees furnishes adequate illumination.

Method of Using the Ergograph

Before starting the test, a special card is filled in with the name, date and type of test, and the muscle balance at 6 meters and 25 cm., also the near points of convergence and accommodation and whether or not correcting lenses were worn. After the height of the perimeter table is adjusted, the head is fixed by having the patient bite the tongue depressor. The distance lenses or near lenses are worn and the near point of convergence or accommodation is tested five times and averaged. In taking the near point, the carriage is held at the back of the track and the test-object carrier is moved on the track. The test-object carrier is usually receded 20 mm. from the average near point of convergence or accommodation; if the patient's accommodation or convergence is too poorly sustained, a greater amplitude of excursion is permitted. The time is noted. In testing convergence fatigue, the patient permits the test object to approach the eyes until doubling of the dot or line occurs. In testing fatigue of accommodation, the patient stops the forward motion of the test object when the print blurs with the right or left eye or with both eyes. When blurring occurs in accommodative fatigue, plus lenses are placed before the eyes to determine whether the fatigue is accomodative or retinal. The test is continued for 10 to 15 minutes, after which the duration of the test, the symptoms during and after the test, and the cooperation of the patient are noted. The muscle balance after the test and also the near point of accommodation or convergence are restudied and recorded.

Uses of the Ergograph in Diagnosis

The ergograph was devised principally to study fatigue of convergence and accommodation.

Convergence. It has been shown[3] that, provided the patient's eyes correspond to a certain standard in regard to the near point of convergence, muscle balance, and muscle strength, the patient would develop no fatigue of convergence in a 10-to-15-minute test. Fatigue tests longer than this are too punishing for the average patient. By using a line instead of a dot as a test object or by correcting hyperphoria with a prism, the effect of neutralizing the vertical imbalance on the ability to sustain convergence may be readily determined. If the patient's symptoms or discomfort during the test for fatigue of convergence are the same as those elicited by reading and if fatigue of accommodation is not present there is strong presumptive evidence that fatigue of convergence may be a factor in causing the asthenopic symptoms.

Accommodation. The study of fatigue of accommodation by means of an ergograph or the performance of a fatigue test without an ergograph is even more important than the study of fatigue of convergence. We have shown elsewhere[4, 5, 6] that although the correlation between the Duane standard for the near point of accommodation and the ability to complete successfully an ergographic test of accommodation is high (+.46), it is not sufficiently high to be relied upon if one wishes to eliminate fatigue of accommodation as a factor in asthenopia. The right or left eye or both eyes may be studied and conclusions may be drawn from the type of curve shown, the symptoms during and after the test, and the effect of the test on muscle balance. We frequently use the test for determining the effect upon the muscle balance of the use of the eyes under strain. It is particularly valuable in patients who have a tendency to convergence excess, with resulting esophoria.

Uses of the Ergograph in Treatment

The ergograph has been of practical use in office and clinic practice for exer-

cising patients suffering from insufficiency of accommodation and convergence. Because patients become interested in improving their record, several who could not be interested in home methods of training accommodation and convergence progressed rapidly under observation and treatment in the office. Records of accommodation and convergence fatigue before and after a series of exercises are shown in figure 2.

Interpretation of the Tracings

Records of fatigue of accommodation. Figure 2A illustrates the development of fatigue of accommodation and shows how the tracings gradually diminish in length. At the end of record A there was practically no effort of accommodation and the test object became so blurred that the test was terminated. Persons with normal accommodation usually sustain accommodation for ten or fifteen

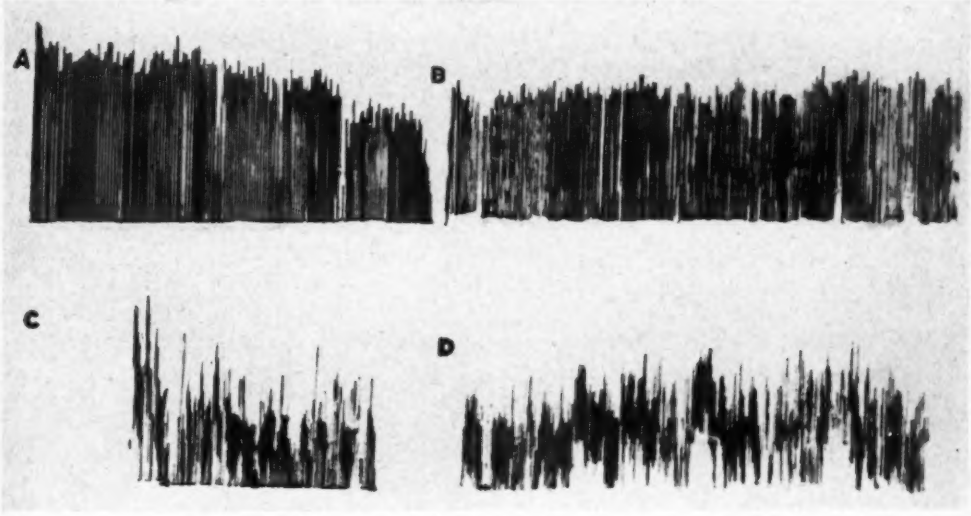

Fig. 2 (Berens). A. Fatigue of accommodation. Record #975, D. R. L., aged 32 years, Jan. 23, 1934. Error of refraction: R. E. +1.50 D. cyl. axis 5° = 20/20—1; L. E. +1.50 D. cyl. axis 175° = 20/20—2. Complaints: Cannot see well for close work. With a 20-mm. recession fatigue of accommodation was present with both eyes even with correction. Near point of accommodation before the test, 155/300; after the test 190/300. Before the fatigue test, muscle balance: at 6 M., esophoria 1Δ, left hyperphoria 0.25Δ; at 25 cm., left hyperphoria 0.25.Δ After the fatigue test, muscle balance: at 6 M., esophoria 0.50Δ; at 25 cm., exophoria 4Δ. There was constant blurring after 7 minutes.

B. The same patient as in A. Record #1005, April 12, 1934. Error of refraction: R. E. +1.25 D. cyl. axis 12° = 20/15; L. E. +1.25 D. cyl. axis 175° = 20/15. Patient stated that he could now see well for close work. The near point of accommodation with correction before the fatigue test was 145/300; after the test 125/300. Muscle balance before the test: at 6 M., exophoria 1Δ, left hyperphoria 1Δ; at 25 cm., esophoria 4Δ. Muscle balance after the test: at 6 M., esophoria 0.50Δ, left hyperphoria 0.50Δ; at 25 cm., esophoria 6Δ. No blurring occurred. The time limit was 10 minutes.

C. Convergence insufficiency. Record #867, G. R. C., aged 19 years, March 13, 1933. Error of refraction: R E. +.25 D. cyl. axis 105° = 20/15; L. E. +.25 D. cyl. axis 80° = 20/20. Complaints: Headaches, eyes tire after thirty minutes' reading even with glasses. With correction there was rapid fatigue of convergence with 20-mm. recession of the test object. The near point of convergence before the test, 90 mm.; after the test, 70 mm. Muscle balance: Orthophoria at 6 M. before and after the fatigue test; at 25 cm., exophoria 5Δ was present before and after the test. Diplopia after four minutes.

D. The same patient as in C. Record #886, April 7, 1933. Fewer headaches, eyes tire less, comfortable without glasses. No fatigue of convergence without correction with 20-mm., recession of the test object. Near point of convergence before the test, 90 mm.; after the test, 85 cm. Muscle balance before the test: Orthophoria at 6 M.; at 25 cm., exophoria 0.50Δ; after the fatigue test: exophoria 1Δ at 6 M.; at 25 cm., orthophoria. No diplopia and no recession of the near point of convergence occurred in the time limit of 10 minutes. May 19, 1933, vision without correction was R.E. 20/20, L.E. 20/30.

minutes, whereas in this patient fatigue developed in seven minutes.

The effect of exercises for accommodation and improved general condition of the patient whose record was shown in Figure 2A is recorded in figure 2B. In spite of the fact that the accommodation had improved and the test object was much closer to the cornea when the test was performed, the tracings were of equal length during the ten-minute test for fatigue of accommodation. The amplitude of excursion was slightly greater at the end than at the beginning of the test, no blurring of the test object developed, and the patient complained of no unpleasant symptoms during the ten-minute test.

Records of fatigue of convergence. Two records of fatigue of convergence are shown in figure 2. The record shown in figure 2C shows rapid development of fatigue of convergence in a boy aged 19 years, who had convergence insufficiency. The patient complained of headaches and tiring of his eyes after reading for thirty minutes even with glasses. In attempting to sustain convergence there was rapid recession of the test object which meant that the near point of convergence was becoming more and more remote until constant diplopia occurred after four minutes.

A record of fatigue of convergence of the same patient shown in record 2C was made three weeks later. The patient had used prism converging exercises at home and had had nasal treatment for mild chronic ethmoiditis. When this record was made he stated his headaches were fewer, his eyes tired less and that he was comfortable without his glasses. During the ten-minute test there was no recession of the near point, as indicated by the uniform height of the tracing. Most of the tracings were longer than the original tracing. The high points indicate that the test object was brought close to the eyes before doubling of the dot occurred. No diplopia occurred within the time limit of ten minutes, and the patient complained of no unpleasant symtoms during or after the test.

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References

[1] Howe, L. Measurement of fatigue of the ocular muscles. Trans. Sect. Ophth., Amer. Med. Assoc., 1912, p. 423.

[2] Berens, C., Hardy, L. H., and Pierce, H. F. Studies in ocular fatigue. I. Convergence. The ophthalmic ergograph: Its evolution and application to aviation. Contrib. to Ophth. Sci., 1926, p. 102.

[3] Berens, C., Hardy, L. H., and Pierce, H. F. Studies in ocular fatigue. II. Convergence fatigue in practice. Trans. Amer. Ophth. Soc., 1926, v. 24, p. 262.

[4] Berens, C., and Stark, E. K. Studies in ocular fatigue. III. Fatigue of accommodation. History, apparatus, and methods of graphic study. Amer. Jour. Ophth., 1932, v. 15, p. 216.

[5] Berens, C., and Stark, E. K. Studies in ocular fatigue. IV. Fatigue of accommodation; Experimental and clinical observations. Amer. Jour. Ophth., 1932, v. 15, p. 527.

[6] Berens, C. An accommodation ergograph. Trans. Amer. Acad. Ophth., 1929, p. 472.

SQUINT MEASUREMENT WITH PRIESTLEY SMITH'S IMPROVED METHOD

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A further modification of Wilkinson's modification of Priestley Smith's device for measuring strabismus, provides that the third tape (suggested by Holzer) be rigid also, and the length increased to 64 cm. The table makes the requisite corrections by adding or subtracting the interpupillary distance as the squint is convergent or divergent.

Exact measurement of squint is essential for choosing the best method of treatment. The ophthalmologist should know with certainty whether a squint has improved or not after the use of atropine, glasses, orthoptic and fusion exercises, or monocular occlusion, etc., in order that he may know whether to continue with conservative treatment or to turn to surgical methods. To judge improvement, one should not rely on empiric inspection but should compare results of exact measurements, expressed in numbers, made before and after the treatment has been established.

To find the cause of the squint, whether due to excessive strength of divergent, or to excessive weakness of convergent muscles (or vice versa), it is necessary to compare the results after measuring the squint exactly at thirteen inches and at twenty feet. Once the cause of the squint has been established, surgical treatment decided upon, and the muscle at fault determined, we must know how many millimeters of shortening or receding are needed, the number of millimeters corresponding to a certain number of degrees of squint to be corrected. This will illustrate the importance of the exact measurement of the degree of squint.

There are many methods in use for this measurement but among the most accurate and practical is Priestley Smith's method as modified by Holzer and later by Wilkinson. In studying this method, which enables the ophthalmologist to work quickly, thereby making it most suitable for the examination of children in whom we find most cases of strabismus, we came to the conclusion that the method could be improved, rendered more accurate but still of practical use.

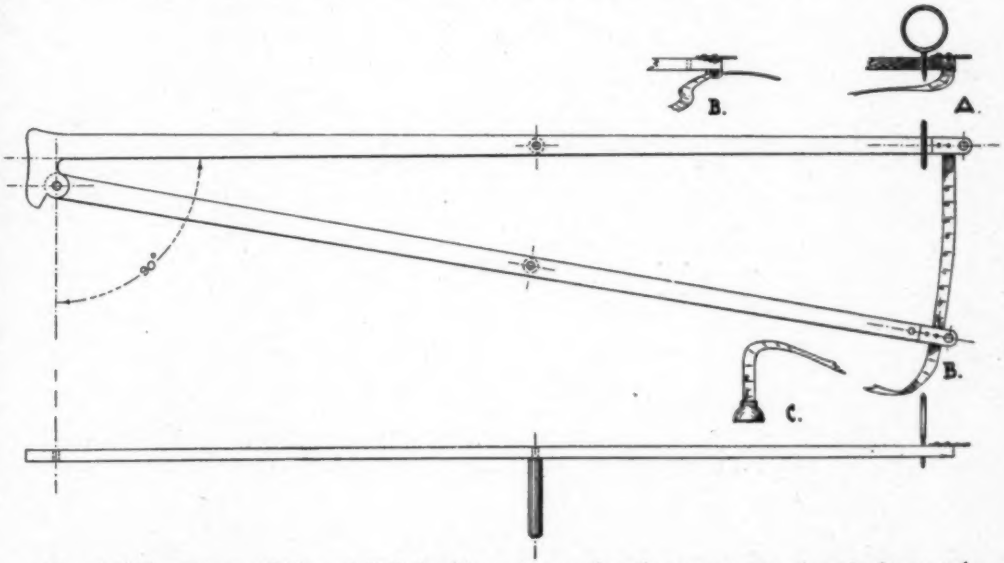

Fig. 1 (Alvaro). In "A" and "B" fixation ring and retinoscope are placed alternately according to deviating eye and kind of squint. In "C" is the plumb weight intended to keep the graduated tape taut.

In Priestley Smith's original method, "a piece of tape, one meter (or 60 cm.) long, one end of which is held by the patient against his temple while the other end is attached to a ring on the surgeon's finger, maintains the requisite distance between the surgeon and the patient. A second piece of tape, graduated and figured, is attached by one end to the same ring and then passes between the fingers of the surgeon's free hand, at which the patient is directed to look. When the separation of the surgeon's hand reaches the measure of the squint, the corneal reflection occupies the normal position of the cornea of the squinting eye." Holzer added a third tape equal in length to the first one (i.e., 60 cm.) connecting the patient's temple and the surgeon's hand holding the graduated and figured tape and maintaining that hand at the convenient distance by holding the third tape taut. Wilkinson devised another modification, consisting of a very light piece of wood 60 cm. long "with one end so shaped as to fit the cheek under the eye, and a ring one inch in diameter placed at the other end; to the cheek end is attached a tape with a ring at its end through which passes the graduated tape attached to the ring end of the wood piece. A handle is placed under the wood piece and is intended for the patient's hand. The patient is directed to hold the cheek end under the fixing eye and fix a light placed at six meters in front of him through the ring, whilst the ophthalmologist takes the ring end of the cheek tape, places the graduated tape through it, holds it in one hand and with the other holds an electric retinoscope causing the corneal reflex to fall in the center of the pupil of the deviating eye. The graduated tape is then drawn taut and the number of centimeters indicates the degree of strabismus."

We thought it advisable to modify Wilkinson's method, by making Holzer's third tape rigid too, so that there would be no necessity to keep that tape taut. As to the graduated tape, it is kept taut by a plumb weight as suggested by M. E. Smukler. The length of the wooden pieces had to be increased to 64 cm. in order to make the instrument more accurate. To 64-cm. sides at an angle of 90° corresponds a hypotenuse of 90 centimeters, each centimeter equivalent to one degree. But even with the corrected length of 64 centimeters the instrument's measurements were not always accurate: if the angle measured by the graduated tape is of 90°, each centimeter is equivalent to one degree, but if the angle is of 20°, the tape will show only 17.5 cm. and, on the other hand, when the angle is 55°, the tape will show 60 cm. It is necessary, therefore, to correct the numbers read directly from the tape and for that purpose we have compiled the following table:

Table 1

TABLE OF CORRECTIONS

Numbers on the graduated tape	Correction
Up to 6	add 1.0
From 7 to 9	add 1.5
From 10 to 12	add 2
From 13 to 18	add 2.5
From 19 to 23	add 2.0
From 24 to 26	add 1.5
From 27 to 29	add 1.0
From 30 to 35	no correction
From 36 to 38	subtract 1.0
From 39 to 41	subtract 1.5
From 42 to 46	subtract 2.0
From 47 to 49	subtract 2.5
From 50 to 52	subtract 3.0
From 53 to 57	subtract 4.0
From 58 to 62	subtract 5.0

To render results still more accurate we should not forget the fact that the angle measured by the instrument is not the real squinting angle, as is shown quite clearly in figure 2. In order to correct that measurement we shall have to take the interpupillary distance into consideration, adding to or subtracting from the corrected result as the strabismus is convergent or divergent.

It might be argued that there is no necessity for such accurate measurements of strabismus when we are not able to be correspondingly accurate in the operation. To 3 degrees of strabismus corresponds "more or less" 1 millimeter of shortening or receding and we know that measurements during the operation cannot be made in fractions of millimeters. But nevertheless we deem it useful to render the measure-

ment more accurate: lack of precision in measurement might lessen accuracy during the operation thus enhancing defects in the end result. If we cannot be accurate to the third of a millimeter during the operation we cannot see why we should make things worse by not being precise to the degree in the measurements of the squint. Using the 60-cm. tape, 54 centimeters on the graduated tape are not 54 degrees, but only 47, which means more than 2 millimeters of difference in the operation.

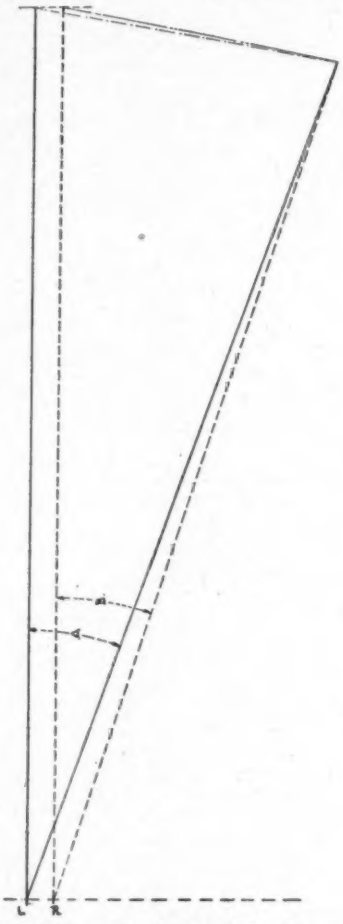

Fig. 2 (Alvaro). Angle A is the squinting angle of the deviating left eye (converging) and angle B is the angle actually measured by the instrument. Correction is obtained by adding the interpupillary distance to the number found on the tape. In dealing with divergent squint, the interpupillary distance should be subtracted.

In the instrument we have devised, the metal ring intended for the fixing eye can be placed alternately on one or the other of the wooden branches, according to the deviating eye and the kind of squint. On the ends of both branches there are metal parts intended for fixation of the retinoscope and both branches are provided with handles, the one on the branch with the fixation ring to be held by the patient and the other by the oculist. An electric retinoscope or an ordinary Liebreich ophthalmoscope may be used for the purpose of reflecting light on the cornea of the deviating eye, and an electric pocket-lamp or even a candle held at 6 meters' distance can be used for the fixed eye. The left branch of the instrument (as looked upon by observer) is placed under left eye of the patient for testing convergent squint and under the right eye for divergent strabismus and vice versa, the right branch is put under the right eye for convergent and under the left eye for divergent squint. Fixation with the light through the ring at 6 meters should always be made by the less amblyopic eye, the observer moving the other branch of the instrument, to which the retinoscope is fixed, until the reflected light on the cornea of the deviating eye reaches the center of the pupil. The number of centimeters between the distal end of the branches is then read on the graduated tape, correction as found in the table above is made and the interpupillary distance in centimeters, added or subtracted as convergent or divergent strabismus is dealt with. The final number expresses the number of angular degrees of squint.

13, Benjamin Constant.

PERIPHERAL IRIDOTOMY (CURRAN) IN GLAUCOMA

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The writer combats the general idea, as expressed by Prof. Elschnig, that this operation has no more permanent effect than a simple anterior-chamber puncture. Dr. Curran's claims are confirmed. Certain points in the technic, such as double tendon fixation and routine counterpuncture, are emphasized. A typical case is cited. Read before the Pacific Coast Oto-Ophthalmological Society at Butte, July, 1934.

On reading Dr. Curran's explanation of his theory and technic one is apt to feel like the yokel who, on seeing a giraffe for the first time, gazed for a long time and then exclaimed "Hell—there ain't no such animal."

In a lecture on the surgery of glaucoma, given last winter in Los Angeles, Prof. Elschnig made a statement to the effect that the tension always returned, after a Curran operation, as soon as the puncture sealed itself. I hope that no one will believe that Dr. Curran and I are so constituted, mentally, as to continue the use of a procedure that eventuates as is claimed by Prof. Elschnig.

My experience, in about forty operations, parallels and confirms all of Dr. Curran's claims, hence any detailed account of it would amount, practically, to copying his papers. Therefore anyone who may be interested is referred to his papers, more especially a late one published in the September, 1932 issue of the Oklahoma State Medical Journal. In that paper he makes the following statement, which, in my opinion, cannot be controverted successfully:

> No one is justified in taking a greater risk when a lesser one may be successful, especially if the lesser will not add to the danger of relieving the pressure by a more radical operation later in case of failure. The operation of iridotomy is this lesser risk.

When used in properly indicated cases the patient stands to win in two ways:

(1) It may be, and usually is, the only operation required.

(2) It does not interfere with other operative work. In case trephining should become necessary, the opening can be made over the iridotomy, and the peripheral iridectomy omitted. The iridotomy then offers the same advantages as iridectomy preliminary to cataract extraction. A most important point in favor of the operation is the relative ease with which a patient's consent can be obtained early in the conduct of a case, meaning as soon as miotics fail to control the symptoms. It is, from the patient's standpoint, a very minor procedure. At the same time it is, in my opinion, the most delicate operation in eye surgery.

Dr. Harold Gifford's paper at the 1921 Colorado Congress and personal conversations with him persuaded me to use the operation. At that time, he was most enthusiastic. Later, because of several mishaps, he changed his mind. Not having had any mishaps, I have continued its use.

Curran claims that the operation balances the pressure behind and in front of the iris, thus deepening the anterior chamber and opening the drainage spaces at its angle. For this reason it is indicated only in those cases that have shallow anterior chambers and, in these, before the drainage spaces have been closed by adhesions to the cornea.

Technic

Certain points must be emphasized:

(1) The Knapp knife needle must have a short (not over 5 mm.) narrow blade, so that its entire length can be manipulated in the anterior chamber.

(2) It must be perfectly sharp in order to cut the iris bridge. Possibly one reason for my freedom from mishaps is my ability to sharpen knives.

(3) The shank must, of course, fill the puncture.

(4) The eye must be fixed at two places to prevent its rotation. I now use two Elschnig forceps, one on the superior rectus, the other on an internus—this when making the hole at "12

o'clock". Curran does not mention the advantage of double fixation.

(5) The puncture is started, subconjunctivally, about 2 mm. below a line tangent to the upper limbus. The blade is directed toward 90 degrees where it picks up and transfixes a fold of iris. In all cases I continue across the anterior chamber and make a counterpuncture in the sclera, allowing a drop of aqueous to escape *subconjunctivally,* in front of the knife point. Dr. Curran does not do this in all cases but he is of the opinion that it favors a better result. The blade is now turned forward and withdrawn slowly, making slight pressure against the cornea. This enlarges the scleral counteropening *subconjunctivally* and cuts the iris bridge. If done properly, the hole is practically invisible, being under the scleral shelf.

It is evident that the cornea must be clear enough that one can see the iris and follow the point of the knife.

The operation can be repeated with benefit, at times, before undertaking more radical procedures.

It is essential, as in the trephining operation, to be on the lookout for quiet iritis and, if necessary, to use homatropine to locate fine synechiae. If any are found, atropin is in order. This occurred in the patient whose report is appended.

My results have been so good that I rarely do either a trephining or an iridectomy. In noninflammatory cases, I do not operate till miotics fail to control the symptoms (vision, tension, and fields). Also I am satisfied if the operation permits control of the disease by miotics in ordinary strength. Many, as in the case reported, never have the need for miotics.

The operation is delicate but not difficult to one who has good hand control. The lens margin is the only structure that the operator must remember to avoid. Permanence of results is hard to determine because of the frequency with which patients are lost track of by change of residence, death, or by going to other attendants. This brings to mind one patient whose symptoms were controlled by $\frac{1}{12}$-percent pilocarpine after bilateral iridotomy. He wanted trephinings, and when I tried to talk him out of it, went elsewhere and had them done. To keep the paper within reasonable limits only one typical case history will be summarized. Dr. Curran, in his various papers, gives many in detail.

Fig. 1 (O'Connor). Result of peripheral iridotomy (Curran). After the operation the use of miotics was discontinued.

This case (results shown in the photograph) was one of chronic, simple glaucoma with moderately severe acute symptoms calling for operation. The right eye was operated on February 8, 1930, for an uncontrolled tension of 50 mm. (Schiötz). Since that date the patient has been entirely free from symptoms that had been present for 12 years and had required the use of miotics. Moreover, she has not used a drop of miotic and at the last visit in February, 1934, her tension was 18, with normal central and peripheral fields and vision corrected to 20/20 plus. Her left eye was operated on December 7, 1933 for an attack similar to that in the right eye. Since 1930 she had used miotics in this eye. On February 8, 1934, this eye also had normal fields, tension, and vision of 20/20 plus. No miotics had been used since the operation. On this date she moved to Los Angeles.

This case is but one among many in

my series that disproves Professor Elschnig's idea, mentioned early in this paper. It is suggested that those who have not tried the operation study the writings of Dr. Curran with an open mind—not like that of the yokel who would not believe his own eyes.

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SIMULTANEOUS CLOSURE OF ALL THE CENTRAL RETINAL VESSELS

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A case of bilateral central retinal artery and vein occlusion is described, its onset immediately consequent upon a tooth extraction. The author offers the most likely etiologic possibilities but draws no definitive conclusions. From the Neurological and Ophthalmological Services of the Montefiore Hospital.

Thrombosis of the central retinal vein is not uncommon and almost always unilateral. Obstruction of both central vein and artery on the same side is less frequent. In the latter, however, the occlusion occurs more often in the branches than in the main trunks. Bilateral obstruction to the circulation in both retinal arteries and veins is very rare.

Goh[1] (1897) recorded a case of bilateral venous thrombosis with hemorrhagic retinitis. The patient was a male, aged 25 years, who, suffering from gangrenous stomatitis with septicemia, died on the third day of his illness. At necropsy a marantic thrombosis of the central retinal vein of the right eye was found 1 mm. behind the lamina cribrosa, and the peripheral retinal vessels were normal although a little distended. In the left eye a thrombus was found in one of the peripheral retinal vessels. Parker[2] (1906) reported a case of quinine amaurosis in which the right eye showed a thrombosis of the inferior branch of the retinal vein; the left, a thrombosis of the superior retinal vein. There was no pathologic examination. Greenwood[3] (1924) described a case in which over a period of three years there were several attacks of iritis in both eyes. This patient suffered also from phlebitis of both eyes. On one occasion there was a positive blood culture. During the course of his illness the patient developed a thrombosis of the right central retinal vein and eight months later, a similar condition in the left eye.

Case Report

The patient, a married female, aged 32 years, was admitted to the Neurological Service of Montefiore Hospital because of blindness in both eyes.

Except for an appendectomy in 1917 and a diagnostic curettage in 1927, the previous history was essentially negative. During the past six years the patient had had all but four teeth extracted, a few at a time. In order to have a plate made, the remaining teeth were pulled from the right lower jaw under local and block anesthesia. The anesthetic used was novol. The pharynx and gums appeared normal. There were a few cavities on the occlusial surfaces of the teeth, but there was no evidence of apical abscesses nor of granulation tissue. Unfortunately, no dental x-rays were taken. An hour later the patient developed a sensation of swelling and numbness on the right side of the face. The following day she complained of headache, diplopia, transient blurring of vision, and flashes of red and green colors. In the evening, a physician found an injected pharynx and a temperature of 101° by mouth. There was an epidemic of influenza in the vicinity and the physician made this diagnosis of the patient's condition. On the following morning (March 3, 1933), 36 hours after the teeth extractions, she awakened and found vision almost

gone. The patient was admitted to the Lebanon Hospital the same morning.

On admission, the fundus examination revealed blurring of the right disc with profuse hemorrhages, exudate, and edema throughout the retina. The picture was typical of thrombosis of the central retinal vein. The left fundus showed similar findings but to a greater degree. Visual acuity on the right was reduced to counting fingers at one foot; on the left, there was no light perception. There was no exophthalmos, edema of the lids, nor congestion of the conjunctivae. Ocular tension (by digital examination) was normal. The pupils were dilated, the left more than the right. The left pupil was fixed, and the right barely reacted to light stimulation.

General physical examination disclosed nothing abnormal. The gums were healthy, showing no evidence of local inflammatory processes at the points of extraction. The condition of the throat on admission was not described. The heart and peripheral vascular system were normal. Blood pressure was 130/70; urine: specific gravity 1.020; no albumin nor sugar; microscopic examination, negative. Aerobic blood culture, taken on the day of admission, was negative.

Course: The patient complained of constant headache and sore throat. On the second day after admission there was no light perception in either eye. The bulbar conjunctivae became congested and edematous, the left more than the right. Exudate appeared on the anterior capsule of the lens in the left eye. Two days later, the right eye showed the hemorrhages to be more pronounced. The tongue was dry and beefy, and the pharynx, injected and granular. She complained of pains in her right knee, left ankle and leg. Tenderness, redness, and swelling appeared over the left leg. The temperature was persistently elevated to 103°F. Repeated blood cultures, spinal-fluid studies, Wassermann reactions, x-ray of the accessory sinuses, and left tibia were all normal.

On the ninth day after admission, the fibrin deposit over the lenses began to disappear and hazily visualized fundi revealed the retinal hemorrhages to be absorbing. The discs were covered by hemorrhages, obscuring all details. The temperature, lasting for 21 days, subsided by lysis; the sore throat disappeared, and the patient was discharged on April 6, 1933, 37 days after admission.

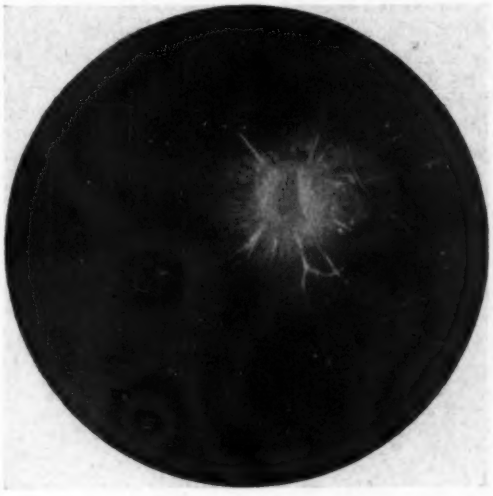

Fig. 1 (Bender). Photographic reproduction of an artist's drawing of the fundus, showing closure of the central retinal vessels.

On April 12, 1933 she was admitted to the Montefiore Hospital for further observation. The physical, neurological, and laboratory studies were negative for pathology.

Fundus examination—O.D.: The nerve head was yellowish white, with indistinct outlines and no vessels present upon it. The fundus was notable upon first inspection by the complete absence of blood vessels, these being represented by a few whitish streaks radiating from the nerve head. There were one or two capillaries from the ciliary system. Pigment degeneration appeared in the region of the macula and above it. In the periphery there were also scattered pigment spots.

O.S.: The nerve head was very similar to that in the right eye, save that it was obscured by numerous opacities in the vitreous which were also present, but to a lesser extent, in the right

eye. The margins of the nerve head seemed indistinct and in the lower pole there was an area which appeared to be connective tissue. The vessel remnants were similar to those in the right eye. In the macular area there were several white spots of choroidal atrophy and probable glial proliferation.

Comment. This case is presented not only for its rarity, but also because of the interesting etiologic problem. The onset of illness occurred shortly after a tooth extraction. The question arises as to the relationship between the tooth extraction, the bilateral occlusion of the central retinal vessels, and the febrile course.

Focal infection is a condition to which many unexplained diseases are frequently attributed. There are numerous case reports of patients who are improved and of patients who are made worse after removal of an abscessed tooth. Judging from therapeutic results and experimental studies, there is undoubtedly some relation between focal infection and the attributed consequent diseases. The pathologic physiology, however, is not clearly understood, for there are many patients with evident foci of infection who are apparently unaffected by their presence or removal.

A possible cause of this obscure eye condition may be the so-called Schwartzman phenomenon. Recently Schwartzman[4] has demonstrated that, "if an injection of bacterial filtrate into the skin of a rabbit is followed 24 hours later by an intravenous injection of a culture filtrate of the same or another bacterium, there appears an extremely severe hemorrhagic necrosis at the prepared sites." To explain this phenomenon in the case described, it must be assumed that the retinal vessels of both eyes were damaged locally by some circulating toxin—for example from the focus of infection, and that the extraction of the teeth produced a mild bacteremia which, in turn, resulted in a hemorrhagic necrosis of the affected retinal vessels. Such a theory may explain the chronologic sequence of events.

It is well known that acute inflammatory diseases, that is, influenza and typhoid fever, may produce thrombosis of blood vessels. There are numerous reports of central-retinal-vein thrombosis related to a definite history of influenza. The thrombosis in these cases is usually secondary to an endophlebitis of the retinal veins. To explain the simultaneous obstruction of the corresponding arteries, it may be assumed that either the same inflammatory process has occurred in the arteries, or else a retrograde infection has spread from vein to artery, due to the obstructed circulation in the vein. In this case, the febrile course of the illness and the early fundus picture suggested inflammatory disease and that the tooth extraction was incidental.

The age of the patient, the lack of evidence of renal, cardiac, or peripheral vascular disease eliminates arteriosclerosis as a probable cause.

References

[1] Goh, K. Arch. f. Ophth., 1897, v. 43, p. 147.
[2] Parker, F. J. Arch. of Ophth., 1906, v. 35, p. 420.
[3] Greenwood, A. Jour. Amer. Med. Assoc., 1924, v. 82, p. 92.
[4] Schwartzman, G. Jour. Exp. Med., 1930, v. 51, p. 571.

SURGERY OF THE RECTUS MUSCLES OF THE EYE: SELECTION OF OPERATIVE PROCEDURES BY DIFFERENTIAL DIAGNOSIS

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Two essential questions are involved: (1) when to operate, and (2) what to do. An endeavor is made to find some means of evaluating and utilizing established operative procedures. It is felt that all methods, when properly selected and applied, must have their good points. With so many varied technics advocated, some differential basis must exist for selecting the method best adapted to the case at hand. Indications and contraindications for surgery are discussed. When nonoperative management has failed to show progress and the defect is becoming worse, with complications of amblyopia ex anopsia and progressive muscular dysfunction developing, surgery is indicated at any age. No one operation is ideal for all cases. A common theme is found connecting differential diagnosis and the surgery of muscular imbalance. Careful scrutiny makes possible a more exact classification of the nature of muscular anomalies. Such differentiation permits the election of various surgical procedures, using each to its best advantage. The relationship between differential diagnosis and the application of surgical corrective measures is discussed. It should be advantageous to be able to select from all the various operative technics the one best fitted to each case. A more refined diagnosis opens the way for such selection. From the Section on Ophthalmology, The Mayo Clinic. Read before the American Ophthalmological Society at Lucerne-in-Quebec, Canada, July, 1934.

In surgery of the rectus muscles of the eye, the physician is confronted with two essential questions; namely, when to operate, and what to do. The answer to the question of when to operate involves consideration of several factors, such as the age of the patient, previous treatment, and the present status of the defect. Consideration of these factors leads to knowledge of the indications and contraindications to surgical intervention. The age of the patient does not seem to be so important as formerly it was considered to be, thanks to the advent of recession. If proper and thorough nonoperative treatment has failed to result in satisfactory progress, and if the defect is becoming worse, and complications of amblyopia exanopsia and progressive muscular dysfunction are developing, operation is indicated at any age.

The satisfactory, even startling, results of early nonoperative treatment are familiar to all ophthalmologists. Properly managed, children are the most eagerly coöperative and pliable of all patients. Objective and subjective testing, and orthoptic training are easily carried out. Many excellent methods and devices are at hand. All have the same objectives; namely, preservation or development of bilateral vision, stereopsis, and fusion. Persistence and direction are the keynotes of success. Progress toward the objectives contraindicates, and failure to approach them indicates, operation.

When operation has been decided on, the choice of operative procedures becomes the issue of importance. Situations are diverse and ideas many. There seems to have been too great a tendency on the part of individual surgeons to stick to one type of operation for most cases. This is natural. One who becomes proficient in, and familiar with, some one technic, is likely to prefer it to the exclusion of other procedures. Hence is observed preference for this operation, or that one, in different geographical localities. I came to the conclusion a number of years ago that the truth, as usual, lies between the extremes of opinion. In all probability there is much merit attached to all the operative procedures advocated, and also there are some defects. If one could identify excellences and defects, and select the technic that is best fitted to the individual case, the problem would be greatly simplified.

In trying to arrive at some basis for such selection it seemed that there was a theme common both to differential diagnosis of muscular anomalies and to their surgical correction. Surgical correction is absolutely dependent on differential diagnosis. As cases are scrutinized, and an attempt is made to

group them with exactness, according to pathology, increasingly refined diagnosis seems possible. Fitting the cases into groups makes it evident that some are amenable to one type of operation, whereas others are more adaptable to another type of surgical correction. For example, convergent strabismus might be corrected by several different operations. One might perform resection, or tucking, of one or both external-rectus muscles. On the other hand, recession or tenotomy of one or both internal-rectus muscles might be carried out. In either event, the cosmetic result might appear good. I believe, however, that the aim should be not only cosmetic improvement but as nearly as possible functional restoration. It is well known that in all cases there are primary defects, muscular insufficiencies or excesses. As these primary defects persist, there develop, as a result, certain secondary muscular dysfunctions, such as weakness or contractures. It seems logical that an endeavor should be made to pick out the primary defects for major efforts at correction, at the same time recognizing secondary involvement. By carefully weighing the extent and degree of each, one should be in better position to decide what surgical technic to follow.

To arrive at such conclusions, one must go back to careful differential diagnosis. The first diagnostic subdivision is, of course, into strabismus and heterophoria. These are again divided into convergent, divergent, and vertical deviations. Although usually interrelated, these three groups may be considered as two, the lateral imbalances and the vertical imbalances.

Taking up the lateral imbalances first: They manifest themselves as a tendency of the eyes to deviate either inward or outward. In other words, as esotropia or esophoria, and as exotropia or exophoria. A casual classification is likely to end here. I feel that it should be still further refined after the method of Duane.

Physiologically, it is known that the function of divergence predominates in distance vision, whereas the function of convergence dominates in near vision. Therefore, a deviation that is greater in distance vision than in near vision is primarily a disturbance of divergence. Conversely, deviations that are greater in near vision than in distance vision are primarily anomalies of convergence. Furthermore, all anomalies must be either excesses or insufficiencies of one of the functions. I have arranged a tabular representation (table 1). Following the line of thought

Table 1

EXCESS AND INSUFFICIENCY UNDER VARIOUS CONDITIONS

Deviation greater in:		
Distance vision		Near vision
1. Exophoria		1. Exophoria
a. Divergence excess	←Exophoria→	a. Convergence insufficiency
2. Esophoria		2. Esophoria
a. Divergence insufficiency	←Esophoria→	a. Convergence excess

suggested, one usually can determine quickly not only whether exophoria or esophoria is present, but also whether the abnormality is primarily an excess or an insufficiency of divergence or of convergence. This further refinement, I feel, is the first step to enable one to select the proper surgical procedure. For example, if convergent strabismus can be due to either excess action of the converging muscles or to insufficient action of the diverging muscles, two opposite surgical attacks are possible. Dependent on the true nature of the pathologic condition, one attack should be more proper than another. The same is true of divergent strabismus. As has been said, it seems logical to bend efforts largely to correction of the primary defect. If the opposing muscles are secondarily weakened or contracted, this is also considered, and they are altered only sufficiently to restore balance. Many times, with correction of the primary difficulty, the secondary manifestations will adjust themselves without further interference. For example, if bilateral recession is performed for convergence excess, the secondary weakness of the external mus-

cles is seen to disappear in a short time.

It is often true that a deviation is the same for distance vision and for near vision, making it more difficult to say whether divergence or convergence is primarily affected. This is evidence of a compensated condition of long standing, which nature has made less troublesome by causing it to become continuous or constant. To determine whether these borderline anomalies are of divergence or of convergence, the second step in differential diagnosis is used. Study of, and comparison of, the powers of rotation of the various muscles in the eight different fields of excursion from the primary position of each eye separately, and of both eyes together, establish certain muscles as excessive and others as deficient. This study can be made by close inspection of the eyes as they rotate, or by the cover test; also prismatic displacement in the various fields can be observed after the excellent method of White. Such a study, coupled with the first step mentioned (periodicity) should eventually establish the exact nature of the defect, the type, and the degree of involvement of the various muscles.

A third maneuver that is most useful in differential diagnosis of lateral imbalance is a study of the power of convergence. White has been largely responsible for bringing this to our attention. In the presence of anomalies either of convergence or of divergence, if one will stimulate the eyes to converge, it is at once evident whether the examiner is dealing with an excessive, a normally sustained, or a defective mechanism. If eyes are stimulated to converge, the mechanism is seen to make the effort to respond or to fail entirely, and this is true even if the eyes are already badly convergent or badly divergent. One soon learns to grade the degree of convergence exhibited, and it furnishes most valuable information. For instance, in the presence of convergent strabismus, when an operation to weaken the internal muscles is contemplated, if the convergence is poorly sustained or normal, it should be treated with respect and care. On the other hand, if it is excessive, much can be safely done for it. In a case of divergent strabismus, if the power of convergence is well sustained, the trouble should be sought in the muscles of divergence, and vice versa. The more I use this sign of White, the more useful it becomes.

Consideration of vertical deviations is somewhat different, in that, as yet, a definite relationship between distance vision and near vision has not been established. Vertical deviations do differ in their relationship to distance vision and near vision, and allowance has to be made for this fact, particularly when prisms are prescribed. Surgically, however, the element of periodicity seems to be of little importance. Diagnostically, vertical deviations are differentiated by the second step that has been mentioned; that is, observation of the powers of rotation chiefly in the four oblique fields, together with observation of the behavior of the eyes in these fields, under conditions of the screen test and prismatic displacement. White's and Dunnington's theses contain most thorough discussion of this phase of work with ocular muscles. It is well established that vertical muscular imbalance is essentially a combination of muscular paresis of one eye with muscular contracture of the associate muscle in the other eye. There may be single or multiple involvement of each eye. Selection of operation is utterly dependent on refined diagnosis. Whether operation shall be performed on the spastic or on the paretic muscles seems to depend on determination of wherein lies the more pronounced defect. It may be necessary to alter both to correct the deviation. The relationship between vertical and lateral imbalance is well known. It is often most difficult to tell which is primary and which is secondary, and to what extent. Careful study along the lines suggested greatly aids in finding the answer to the question. When vertical deviation complicates lateral imbalance, the vertical deviation always must be given respectful consideration. The vertical deviation may be corrected first or in combination with the lateral imbalance, as is seen fit after careful study of relationships. In hyperesotropia, I have found it most successful to tenotomize

the inferior-oblique muscle at its insertion, while reinforcing the external-rectus muscle after the method of Dunnington.

Putting together, then, the factors of periodicity, powers of rotation, screen deviation, prismatic displacement, and latent power of convergence, one gets a more comprehensive and exact picture of muscular imbalance. No longer does the ophthalmologist contemplate operating for heterophoria or heterotropia, as such, for cosmetic effect only. He becomes interested in getting more detailed information regarding the individual muscular relationships with the fundamental ideal of restoration of function. In striving for this ideal, I believe better cosmetic results are also obtained. Certainly, since this point of view has been adopted at The Mayo Clinic results have noticeably improved and the interest of the work has greatly increased. Each case becomes a law unto itself instead of being subject to a routine procedure.

Having carried out a detailed and exact differential diagnosis, one is in position to decide on a plan of surgical attack. Certain muscles need reinforcement and others need weakening. The need of each has been determined, together with its relative importance as a primary and as a secondary procedure. As has been said in the foregoing, emphasis is to be put on the procedure of which the purpose is correction of the primary defect. Whether or not the

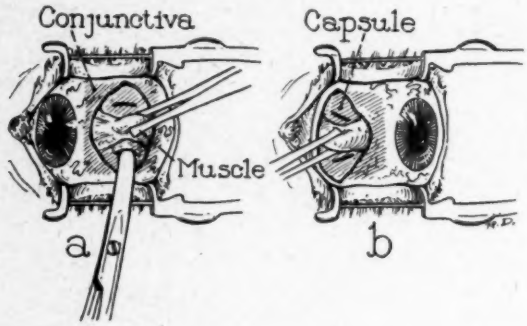

Fig. 1 (Prangen). Undermining of the conjunctiva, incision of the capsule, and isolation of the capsular tendinous flap.

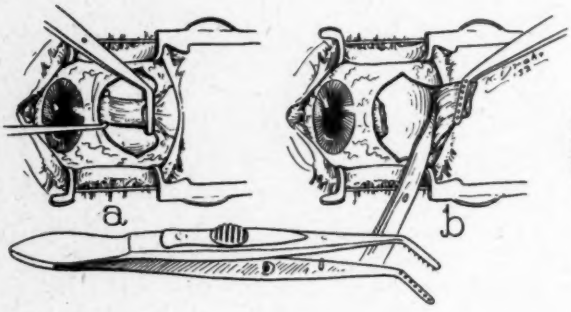

Fig. 2 (Prangen). a, Tendon in forceps ready for resection, conjunctiva included. b, Freeing of adhesions between muscle and globe.

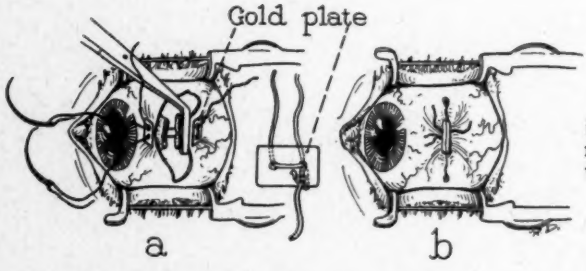

Fig. 3 (Prangen). a, Gold plates in position ready to be approximated. b, Final appearance after wound is closed.

secondary defects are to be the objects of therapeutic effort depends, first, on the success of the primary operation, and second, on the degree of secondary dysfunction. If the latter is very marked, it, of necessity, requires adjustment. If it is mild, it is often better to give it a chance to undergo readjustment after the primary correction has been made; in other words, it may be preferable to perform the secondary operation later, if necessary. Jameson's suggestion to explore doubtful muscles after exposure is most timely. Occasionally a supposedly innocent or normal internal-rectus muscle is found to be markedly excessive, requiring immediate adjustment in order to insure successful function of the reinforced externus muscle; this, in spite of previous clinical study. It is rare, however, for the preoperative diagnosis of the muscular relationships to be changed or for the plan of attack decided on before the operating room is reached to be abandoned. It is gratifying to have diagnosis confirmed when the field is exposed and to have results justify the diagnosis.

Technic is a matter of individual preference. For lessening muscular action, we at the clinic have found recession an ideal procedure. It is a safe, nonmutilating operation, and is capable of control by measurement. It permits of an attempt being made to obtain physiologic restoration. We have the feeling that ophthalmology has outgrown complete tenotomy of the internal-rectus muscles. Occasionally, partial tenotomy may be indicated to lessen temporarily the action of a spastic internus muscle secondary to reinforcement of an externus. We have performed partial tenotomy many times, and have seen on return visits many patients who have undergone the operation. We are convinced that the muscle invariably returns to its original state of contracture through filling in and cicatrization of the original incisions in the tendon.

I have modified the Jameson technic for recession, using two instead of three buried gut sutures for scleral anchorage. The conjunctiva is closed separately over the recessed tendon, burying the two gut sutures. In this way I feel that cicatrization is diminished and that there is less shortening of the conjunctiva, which when it occurs lessens the effect of recession. I also pass the sutures through the free end of the tendon, in front of the muscle clamp, instead of behind it, so as not to lessen the amount of recession. I find 0000 plain gut sutures strong enough, and much prefer the Jameson needle to others. Results with recession, in my hands, have been excellent. Instead of a crippled action, normal function is more often obtained. It is not uncommon to see convergence reëstablished.

For reinforcement of muscle action, we at the clinic prefer the single tuck and the resection. If the deviation is not too great, and the muscle has good latent power, tucking is often done. On the contrary, with marked deviation, and obviously paretic or paralyzed muscles, we find that greater gain can result from resection. With thorough isolation and freeing of the muscle (figs. 1 and 2) from all attachments, it is astonishing how much can be safely resected, 15 mm. at least. Objections to tucking are the difficulty in passing the needles when a large tuck, more than 5 mm., is attempted, and the usual, marked postoperative reaction. This reaction always has subsided without injury, and results have been uniformly satisfactory. We use 00 plain gut for sutures. For resection, we prefer Wiener's gold plates as splints to hold the cut ends of the tendon together (fig. 3). We prefer these to multiple sutures tightly tied in the tissues for anchorage. Strangulation resulting from multiple sutures invites sloughing and necrosis, with resultant failure. This we have experienced with other forms of resection, but only once in the ten years' use of the gold plates, and then when infection occurred. The operation is easily performed. Reactions are, as a rule, minimal, and in our hands much less than from tucking. Objection is found to removing the gold plates, which are left in place for nine days. These grow in, underneath the conjunctiva. They are originally placed outside the conjunctiva, but become covered with a secondary fold of the same tissue. Grasping

the marker thread and making traction, the secondary fold is easily split open with scissors, and the plates slip out as the knot is cut over the anterior plate. Our results with this form of resection have been excellent. Sutures used are number 6, twisted black silk.

True advancement of a tendon we have ceased to employ. It is believed to be useless to advance, because the most posterior point of attachment of the advanced tendon determines the point of pull. Undoubtedly, this point is close to the original insertion. It is probably the shortening and not the advancing of the tendon which is important.

Conclusions

1. It should be to the surgeon's advantage to be able to select from all the various operative technics the one best fitted to the case in hand.

2. More refined differential diagnosis opens the way for such selection.

3. Efforts should be largely directed to correction of the primary defect, recognizing the degree of secondary dysfunction and correcting it only sufficiently to restore balance.

4. Fundamentally, the aim should be restoration of function, cosmetic results will naturally follow.

The Mayo Clinic.

References

Duane, Alex. In Fuchs, E., Textbook of ophthalmology. Ed. 5, Philadelphia, J. B. Lippincott Company, 1924, pp. 780-783.

Dunnington, J. H. Tenotomy of the inferior oblique. Trans. Amer. Ophth. Soc., 1929, v. 27, pp. 277-296.

Jameson, P. G. Surgical entity of muscle recession. Arch. of Ophth., 1931, September, v. 6, pp. 329-361.

White, J. W. Paralysis of superior rectus muscle. Trans. Amer. Ophth. Soc., 1933, v. 31, pp. 551-584.

NOTES, CASES, INSTRUMENTS

A TEST FOR FUSION AND A FUSION SPECTACLE*

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Because the screen test, although easily applied, is not always reliable in determining the presence of binocular simultaneous fixation in children and some adults, it is desirable to utilize other rapid methods of determining whether single binocular vision is present. The Worth test, which is excellent, can be used only at a distance, and many patients who fuse at 6 meters have diplopia at 25 cm.

The test to be described is simple, accurate, and rapid, is applicable for distance and near, and is reliable even in the examination of young children.

A spectacle frame is fitted with a +1.50 diopter red cylindric lens (axis 180 degrees) on one side, and a green plano lens on the other side. The frame is reversible so that the red glass may be placed before either eye.

The patient should wear correcting lenses. The fusion spectacle should be worn with the red lens before the eye with poorer visual acuity. The patient is asked to fix a small light, approximately 15 mm. in diameter, at a distance of 20 feet (6 meters). A short, wide band of red light is seen with one eye, while a round green light is seen with the other eye. Subjects with normal muscle balance fuse these easily as a pale reddish light. Children can readily describe what they see.

By moving the spectacle up and down rapidly in the vertical plane the red band of light will be observed to pass through the green circle. The red light may be used as a check on the reliability of the answers. The movement of the red light in the vertical plane may be made purposely slow to determine whether fusion can be maintained. When the axis of the cylinder is vertical, the band of light is horizontal, therefore vertical imbalance is readily discovered. Placing the axis of the red cylindric lens at 90 degrees is an advantage in checking for hyperphoria but, unless the interpupillary distance is changeable, slight lateral imbalance is produced. The test should be repeated at 25 cm., using a 3-mm. point source of light as a test object.

Experiments were made with a cobalt-blue cylindric lens (axis 90 degrees) and a plano red lens. However, owing to the fact that the contrast between green and red is greater than that between red and blue, the former combination was employed in the standard spectacle. How color blindness might influence the interpretation of the findings with this test has not yet been determined.

The spectacle assists in the rapid determination of the following points: 1. The type of diplopia (homonymous, crossed, vertical or combined) at 6 meters and at 25 cm. 2. The existence of suppression and the eye affected. 3. The possibility of causing the appreciation of diplopia by a moving red object when suppression exists. 4. The diagnosis of suppression in alternating strabismus. 5. The presence of fusion (second grade binocular vision) both for near and distance. 6. The occurrence of slight amplitude of fusion in the vertical plane. 7. The correcting prism or prisms which will bring about superposition or fusion of the two images. 8. The presence of false projection by demonstrating the existence of diplopia which does not correspond with the true deviation, i.e., homonymous diplopia in exotropia.

35 East Seventieth Street.

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*Made by E. B. Meyrowitz and Company, 520 Fifth Avenue, New York, N.Y. This study was aided by a grant from the Ophthalmological Foundation, Inc. Presented before the Section on Ophthalmology, American Medical Association, Cleveland, June 14, 1934.

RARE TYPE OF CONGENITAL CATARACT

Lt. Col. R. E. Wright, I.M.S.
AND
Dr. K. Koman Nayar, D.O.M.S.
MADRAS, INDIA

A female Hindu child was brought to the Government Ophthalmic Hospital, Madras, at the age of 11 months, with a discharge from the eyes which the mother said had been going on since 4 days after birth. Gonococci were present in the smear. The left cornea was somewhat hazy, the right was normal. The child showed lenticular opacities in both eyes. After a couple of months, when the conjunctival condition was cured, the child was admitted for operation. The pupils were round and small and would not dilate more than half with repeated administration of atropine. The lenses were cataractous in the pupillary areas right up to the capsule, but the peripheries could not be seen. The opaque lens matter was uniform and finely granular.

The child was a fine healthy infant; the mother also looked healthy and her blood and urine were normal. It was her first child and there had been no miscarriages. She had edema of the body and legs just prior to the birth, and eclampsia just after, but made a complete recovery; otherwise she had been quite healthy during the whole pregnancy. A family history was not obtainable.

The child was prepared for operation and discission was done on the left side. The cataract was of a mixed consistence, partially milky and partially friable, but nothing further was noted. The pupil contracted to pin point immediately and only by means of vigorous irrigation could the lens matter be dislodged completely. A perfectly clear black pupil resulted. The right eye was then similarly treated; a keratome incision in the cornea being carried through into the anterior capsule. Immediately a milky fluid escaped through the incision, but the outer cortical shell retained its shape. It was presumed that the bulk of the lens center was fluid, a condition with which we were familiar. The outer shell was carefully broken up with the irrigator nozzle and stream, and came away completely in sectors. During this process it was noticed that a small opaque spherical mass like a grain of pearl barley came through into the anterior chamber. It was carefully removed and caught in a watch glass of saline. This proved to be a firm cataractous fetal nucleus with its Y figures showing up sharply, apparently on the surface. Under the binocular microscope it was seen to be uniformly opaque and granular, the Y figures being more translucent. We have observed the fetal nucleus represented by a cystic cavity filled with milky fluid, but a solid cataractous fetal nucleus surrounded by a milky fluid, enclosed in turn by an opaque friable shell was new to us.

A consideration of our observation is interesting in view of the nomenclature used by biomicroscopists in connection with the reflecting surfaces and intervening layers of the lens as seen in optical section, and the time factors on which it is based. If we assumed that the fetal nucleus to which we refer was that portion of the lens bounded by the Y figures and laid down in the first eight months of intrauterine life, the surrounding fluid and sectored crust must have represented the production of the following fourteen months.

Government Ophthalmic Hospital.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section on Ophthalmology

May 11, 1934

Dr. Gordon New, president

Sympathetic ophthalmia

Dr. Karl C. Wold (St. Paul) presented William S., aged 5 years, who on October 9, 1933, fell into some bushes, injuring the right eye. He was immediately taken to a hospital. Examination revealed a penetrating wound of the sclera within a few millimeters of the limbus and running parallel to it for about one centimeter at the lower border. There was bleeding from the wound, which was gaping, and a roll of iris and ciliary body prolapsed into it.

Surgery was advised, and an operation was performed a few hours following the injury. A portion of the iris was excised and columns of iris were replaced. At this point, there was a slight loss of vitreous. The conjunctiva was then dissected away at the limbus and around the lower three-fourths of the cornea and sutured with silk on both sides.

The conjunctival flap stayed in place for five days. There was very little reaction in the eyeball, and the patient left the hospital in two weeks but was seen every other day for examination and care.

On November 15th, five weeks and two days after the accident, there was congestion of the injured eyeball, especially circumcorneally, and an apparent beginning shrinkage. A plastic exudate bound the pupil to the anterior lens capsule. Neither light perception nor projection was present in the eye at this time.

The left eye (sympathizing eye) showed no external signs of inflammation. Slitlamp examination revealed leucocytes on the posterior surface of the cornea, fuzziness of the pupillary margin of the iris, and beginning exudation on the anterior capsule of the lens.

Immediate removal of the right eye was then advised because of beginning symptoms of inflammation in the uveal tract of the left eye, and the blind right eye had plastic iridocyclitis and begining shrinkage. Enucleation was performed on November 15th, and a wax ball was implanted in the capsule.

Subsequent examination of the left eye showed a slight circumcorneal injection which lasted about ten days, and also a gradual diminution in the exudative process into the anterior chamber. The lower portion of the inner surface of the cornea looked as though milk had been thinly sprayed over it. On December 1st the eye was quiet externally. There was one large globular deposit on the posterior corneal surface, and precipitation was present. A careful examination of the fundus revealed no pathological changes. Treatment during this time consisted of atropin, dionin, milk injections, and the wearing of dark glasses.

The pathological report on the enucleated eye stated that there was a large amount of chronic inflammatory infiltration throughout the choroid and ciliary body. In the ciliary body there were tubercle-like nodules composed of epithelioid cells and a few giant cells.

Reference was made to a recent article by Dr. Dvorak Theobald in the Transactions of the American Academy of Ophthalmology and Otolaryngology on the Frequency of Sympathetic Ophthalmia. Dr. Theobald made a study of 1465 cases of perforating injury at the Illinois Eye and Ear Infirmary in which ten cases of sympathetic ophthalmia developed. She came to the following conclusions: 1st, that it occurred with the greatest frequency

in the first decade, and 2nd, that the frequency of sympathetic ophthalmia was less than the enucleations performed for it, or for fear of it. Enucleation was justified by the fact that there were no certain means of determining the presence of an actual sympathetic ophthalmia.

Discussion. Dr. W. L. Benedict thought that in some cases, even though there was no vision in the injured eye, one might be justified in trying to save the eye. In support of this he cited the case of a patient whose right eye was injured by flying glass, resulting in a laceration of the globe extending 6 mm. in the cornea beyond the limbus into the sclera. At the time Dr. Benedict saw the patient there was no vision in the injured eye and he advised enucleation, but the family objected and it was not done. There was a prolapse of the iris, so an iridectomy was performed. He then resorted to foreign protein injections, using three injections of milk intragluteally, of 10 c.c. each, followed by five intravenous injections of typhoid vaccine. That was in February. Today, with his glasses, the man had 6/6 vision in that eye.

One other point that Dr. Benedict wished to emphasize was that local treatment was not so effective, as a rule, as constitutional treatment. By the use of foreign protein injections one could nearly always avoid sympathetic ophthalmia.

Dr. Benedict considered this a question of considerable medico-legal importance. He believed that in medico-legal cases the question of adequacy of treatment might arise. As prophylactic against sympathetic ophthalmia in an otherwise healthy adult, three intramuscular injections of milk and five intravenous injections of typhoid vaccine would be considered adequate treatment, and anything less than that might lay the doctor liable for inadequate treatment.

The question had come up as to the use of the Gifford treatment, and while it probably was very effective in the hands of those who had used it, the method had not become so general in practice as the use of foreign proteins. He believed if oculists as a body would agree on what constituted adequate treatment in such cases, it would save them a good deal of controversy in medico-legal cases.

Dr. George C. Dittman (St. Paul) said that while one must recognize the value of foreign proteins and salicylates advocated by Dr. Gifford in the treatment of sympathetic ophthalmia as the first means for saving the injured eye, due importance must be given to the early removal of the injured eye as a prophylactic for saving the sympathizing eye.

With regard to the justification for removal of the eye, Dr. Dittman said the rules formulated by Dr. Henry R. Swanzy of Dublin in his book "Diseases of the Eye" published in the early '90s were not so antiquated even if adopted in the 20th century.

The baffling commonplace: migraine

Dr. W. W. Lewis (St. Paul) read a paper on this subject which was published in Lancet, 1934, v. 54, Oct., pp. 659-663.

Discussion. Dr. Frank Burch (St. Paul) said that ophthalmic migraine, in his experience, had not been of frequent occurrence. Oculists saw patients referred for relief of migraine, but usually both oculists and patients were disappointed in the results. In Dr. Burch's experience, patients who obtained relief by correction of refractive errors had been very few; those who were improved were usually patients in whom there existed muscle imbalance.

The "reflex" theory of migraine might stand better analysis. Within the last few weeks he had seen a patient who, wearing a perfect correction for his refractive error, had quite typical migraine attacks after exposure to glare. The patient was referred by his physician, but the history alone was enough to show that glare was producing these attacks of migraine, aside from all other causes.

Some years ago, before the Royal Academy of Medicine, J. Herbert Fisher detailed his own case and then elabo-

rated the theory that a great many cases of migraine were caused by anomalies of the pituitary gland. Very few women in gestation ever had migraine attacks. De Schweinitz did not support that theory and was of the opinion that, during menstruation, women had more attacks of migraine than at other times.

Dr. Burch said the endocrines might play some part in the causation of migraine because the majority of the cases occurred in the period between adolescence and the climacteric, in both men and women. Professor Fuchs had migraine throughout his life. Dr. Burch recalled one doctor who had hyperphoria before and sometimes diplopia during attacks. In this case there was a question whether the migraine followed the hyperphoria, or whether the cause of the migraine was the cause of the hyperphoria. At any rate, other than when the attacks manifested themselves, he had no hyperphoria, even after occlusion test. Dr. Burch said Dr. Grant and he had seen one patient where there was a question of transitory ophthalmoplegia associated with true migraine, but there was no opportunity to determine the later history. This must be an uncommon complication, as this one doubtful case was the only one he had observed in thirty years.

Dr. H. V. Hanson (Fort Snelling) said, in presenting such a great number of types and causes for headache as Dr. Lewis had considered, he thought it would be well to include a group of cases in which headache was attributed to sclerosis of the pituitary ligament preventing the pituitary gland from enlarging during the menstrual period. He had seen somewhere an article in which the author had proven by autopsy findings that the pituitary ligament had become sclerosed to such an extent that the gland could not expand during these cycles.

Spasm of the inferior oblique muscle and its operative treatment

Dr. Virgil Schwartz (Minneapolis) said that one of the most uncommon forms of muscular anomaly which the ophthalmologist was called upon to treat, was a paralysis or paresis of a muscle of one eye with a secondary spasm of its associate in the opposite eye. He had encountered six or eight such cases in all of which tenotomy of the inferior oblique was indicated and performed. The paresis was usually of the superior rectus muscle, and the characteristic symptom was a tendency of one eye to shoot markedly upward as it turned medially.

The technic of the tenotomy was rather simple. The spastic inferior oblique was located through a skin incision, traction was made upon it with a muscle hook to make certain that it was the muscle desired, and the tendon was then divided. Healing was prompt and the results in his series had been very gratifying.

Discussion. Dr. H. W. Grant (St. Paul) said some interesting researches had been done at Temple University on the impulses from the voluntary centers in the pre-central gyrus and the involuntary centers in the occipital cortex. Because of the law of reciprocal innervation, it was necessary that a subcortical center exist for the distribution of these impulses. This center was located by Spiegel in the vestibular nuclei both for the voluntary and involuntary movements. Until the present time the centers for control of movements of the vertical recti were less well known. They probably resided, according to Riley, in the collicular plate, stimulation of which was the only area which gave rise to both elevation and depression. Control of movements of elevation and depression was usually developed at birth, while those for lateral movements developed at the 58th or 60th day. Slight paralyses of the vertical recti were apparently more common than the lateral and often were the cause of a convergent squint. Undoubtedly, tenotomy of the inferior oblique was a very satisfactory treatment for convergent squint, especially when associated with paresis of one superior rectus, and spasm of the inferior oblique.

Walter E. Camp,
Secretary.

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

October 12, 1934

Mr. Ransom Pickard, president

Retinal detachment in an aphakic eye cured by Safar's method

Mr. T. C. Summers showed a woman aged 62 years who was first seen on July 2nd last, with the complaint of the vision in the left eye having been suddenly lost two weeks before. A large billowing detachment above was seen, affecting more than half the retina. The eye was aphakic, the lens having been removed a year ago. A small round hole was found in the "10 o'clock" position, and four disc diameters from the ora.

With a 70 milliampere current, 46 punctures were made, and an uninterrupted recovery ensued. Ten days ago the vision was 6/9 partly. The whole retina was in situ, and the site of the operation was shown by a large area of old choroiditis. It seemed desirable that a more accurate search for the holes in these cases should be made than was sometimes carried out.

The causation of herpes ophthalmicus

Mr. Ransom Pickard said that the main clinical fact established of late years about this condition was the relationship of herpes zoster to varicella. Either disease was able to cause the other; less frequently they could coexist in the same person. That these two phases were unstable was shown by the moderate frequency with which the two diseases were transmuted in passing from one person to another, but the varicella phase was the more infectious as such. Herpes corneae had two phases, the dermatotropic and the neurotropic, and there was some interchangeability between the two strains of herpes corneae, though the encephalitic variety became more specialized and less transmutable than the dermatotropic.

Head and Campbell showed that the main seat of inflammation was in the posterior root ganglion, and that it spread up and down the nerve to a slight extent. Degeneration sometimes spread up into the posterior column of the cord and down the sensory nerve and its branches to their entry into the cutis. In two cases investigated no lesions of the ganglia and nerves were found eight months after the attack.

The eye attacked with herpes ophthalmicus was severely affected with iritis and hypopyon, and, on excision, the iris had been found to be in part necrosed, and the adjoining portions of the ciliary body and sclerotic were involved. In the uvea near to this, in front of the ora serrata, was a small nodule. The retina was unaffected, except by infiltration of a few mononuclear cells. The optic papilla was slightly edematous and contained a few round cells. The optic nerve showed destruction and fibrillation of the medullary sheaths of the nerve fibers. The ciliary nerves showed marked changes; they were surrounded by a sheath of mononuclear cells, the endoneurium also showing many of these. The ciliary vessels were not affected. The suggestion that the skin eruption in herpes zoster was due to an alteration in the trophic impulses from the affected posterior root ganglion or spinal cord was not, he considered, adequate in explaining the groups of vesicles in the skin, or the manifestations in and about the eye. Levaditi believed that there was a normal "tonus immunotrophique" in each spinal segment, which prevented infection, and lowering of this enabled the organism to establish itself in the segment of that part of the body supplied by it. Head and Campbell suggested that the production of the rash was due to an intense irritation in the cells in the ganglion which normally subserved the function of pain, particularly that form of pain which was produced by afferent visceral impulses. If the rash were due to increased activity in the posterior root ganglion, causing an increase in the normal trophic impulse, it would be expected to produce a more uniform effect on the skin than actually happened, for the lesions in the gan-

glion were usually diffuse, not confined to limited areas. In a case of herpes sufficiently severe to cause vesicles to appear in all parts of the skin area corresponding to the ganglion affected, it was often found that the skin was not even reddened in the areas between the individual vesicles. There was, therefore, selectivity. Within a group, the individual vesicles tended always to coalesce. It was a fair conclusion that the vesicles were caused by the exciting organism itself, acting either from a distance by nerve impulses, by transmission of the toxin along the nerves, or by actual passage of the organism. Toxins could be excluded.

It had been proved that the herpes zoster phase had a special affinity for the posterior root ganglion. Let it be assumed that it normally spread thence along the sensory nerves to the tissues supplied by them, that on reaching the fibrous tissue covered by cells of ectodermal origin the organism reverted to the varicella phase. Let it also be assumed that in some cases the organism could spread locally from the posterior ganglion, thus reaching adjoining structures. These assumptions Mr. Pickard applied to herpes ophthalmicus.

The usual sequence was that pain occurred three or four days before the rash appeared. The interval represented the growth of the organism along the nerves. More difficult to explain was the late occurrence of keratitis, iritis, and cyclitis.

In regard to lesions other than those of the skin and globe, there was a rare complication of herpes ophthalmicus, affection of the optic nerve with complete and permanent blindness. There was no anatomical or developmental connection between the optic nerve and the Gasserian ganglion, but they were only 2 to 3 mm. from each other. Such a case could be most simply explained by a local spread to the optic nerve. Similar reasoning could be applied to paralyses or pareses of the 3rd, 4th and 6th nerves when invoking the fact that it was the posterior root ganglion for these nerves.

One special feature of herpes zoster, especially in the first division of the 5th nerve, was its erratic distribution and intensity.

The conception of a two-phase virus, each phase easily transmutable to the other, would account in a simple manner for the epidemics of herpes zoster and varicella, each breeding true, for the interchange (which occurred fairly often), and for the occasional occurrence of both in the same individual.

Herpes zoster might occur in other diseases, and from poisoning due to various causes. It was possible that more than one organism could behave in the way which caused herpes zoster. Some cases had occurred in series, thus suggesting infection. It had been proved that a virus could travel centrifugally.

The final test of this theory must be experimental, and for such experimentation, a susceptible animal must be obtained.

(Reported by H. Dickinson)

BROOKLYN OPHTHALMOLOGICAL SOCIETY

November 15, 1934

Dr. John H. Bailey, president

Unilateral ophthalmoplegia totalis—parasellar osteochondroma

Dr. Jesse M. Levitt presented the case of a 20-year-old woman. Ocular examination revealed a moderate ptosis, an almost complete ophthalmoplegia totalis with a very slight exophthalmos of the left eye, and a bilateral corneal hypesthesia. General physical and neurological examinations and laboratory studies yielded negative results. Skull roentgenograms served to localize a left calcified parasellar neoplasm. Operation disclosed a tumor at the junction of the left sphenoid ridge and the anterior clinoid process. Microscopic examination of the tumor showed an osteochondroma with secondary changes. The tumor was probably derived from the sphenoid bone. The ocular findings were the result of compression of the trunks of the third, fourth, first division of the fifth, and

the sixth cranial nerves, coursing in the cavernous sinus. Two months after operation the upper lid of the left eye had returned to a normal position and the functions of the external and internal recti muscles had been partly restored.

This case represented an early type of basal intracranial tumor and illustrated the clinical syndrome of the external wall of the cavernous sinus in a pure form.

Bilateral papilledema due to chronic arachnoiditis

Dr. M. A. Lasky presented H. G., a 7-year-old boy, who was hospitalized on January 22, 1931, with the chief complaint of severe headaches accompanied by progressively blurred vision during the last two months. The family history was negative for any transmissable disease or any cranial or ocular disease.

The boy was delivered by forceps, weighed five pounds at birth, and had to be resuscitated from an asphyxia livida. He had progressed quite normally but had had the following ailments: jaundice for the first nine months of life; whooping cough at five months of age; measles at fourteen months. Until three years of age he had had convulsions which were characterized by sudden stiffening, pallor, blue lips, all of few minutes duration. About five months before Dr. Lasky first saw him he was hit on the right ear by a baseball bat, but did not lose consciousness.

Two months previous to admission he returned home from school complaining of headache and lassitude. When he was put to bed a low grade fever was noticed. This attack lasted a few days and left him in a very weak condition. There were frequent recurrences of this ailment, but the intervals soon lengthened, and the last attack was three weeks before admission. At this time he noticed a definite blurring of vision.

Physical examination revealed an underdeveloped, undernourished, pallid, hypersensitive boy who had exaggerated reflexes, marked bulging of the frontal bones and the following eye findings: corrected vision O.D. 15/20, O.S. 15/40, normal form fields, and pupils which were equal, regular and normal in their light and accommodation reactions. There were three diopters of papilledema in each eye, no exudates nor hemorrhages and slightly engorged veins. There were no other physical findings of note. All laboratory tests were negative including a provocative Wassermann. There was no increased pressure in the ventricular or spinal fluid. The ventriculogram showed increased convolutional markings that were more accentuated over the posterior half of the skull. No pathology of the ventricular system was noted.

About one month subsequent to the trepanation the right disc was flat with blurred edges and the left disc was raised one and one half diopters. The patient was much brighter, active, had no headaches, felt fine and had clear vision. For one year he continued in good health and then the attacks recurred. They were now characterized by a low grade fever, headaches, frontal as a rule, and associated with nausea and vomiting. Their duration was one to two days, and they increased in frequency until he was having an average of two a week with blurred vision again. He was again hospitalized in January, 1934, three years after the first admission.

Physical findings were essentially negative except as referred to the head and eyes. He had a typical hydrocephalic skull, and one observer thought that there was a mild exophthalmos present. Corrected vision was 15/30 O.D., and 15/40 O.S. A ventriculogram, using the old trephine opening, was again negative except for a possible slight dilatation of the third ventricle. Spinal fluid pressure was normal as was intracranial pressure. The cranium showed typical hydrocephalic markings, much more than the plates of three years ago. All laboratory tests were again negative.

While in the hospital his headaches gradually disappeared and he had had none since. He was an active boy, had no complaints, and now after ten months his vision was corrected, O.D. 15/30, and O.S. 15/50+1. The form fields were

still normal. The right disc was still blurred and edematous about one-and-one-half diopters. The left disc was less blurred, slightly pale and about one-half diopter elevated.

Joseph M. L. Bruno,
Associate Secretary.

CHICAGO OPHTHALMOLOGICAL SOCIETY

October 15, 1934

Dr. E. V. L. Brown, president

Prisms in optical iridectomy

Dr. Louis Bothman said that his patient, a woman 29 years of age, had had ophthalmia neonatorum at birth. This had resulted in a very large scar in the center of each cornea. The left eye had been enucleated at the age of 5 years because of pain and redness. She had had a superior iridectomy performed in the right eye. The vision was 1/10 with a high myopic correction. She held her head tilted downward when looking through this opening. Another iridectomy had been done in the lower nasal quadrant, through which she obtained 0.3 vision, but had to tilt her head up. She wore a five and three fourth's degree prism base in and a three and one-half degree prism, base up, secured by decentering the lens. The patient was shown to demonstrate the value of lower nasal quadrant iridectomy versus superior iridectomy, and the use of a prism to prevent head tilting.

Blood clot in the fundus

Dr. Dewey Katz said that in this case the exact diagnosis was doubtful, there being a question whether the fundus pathology was due solely to hemorrhage, or whether a tumor was present and the hemorrhage was secondary. The patient stated that during the first two weeks in August, while travelling in the west, every time she ascended to a high altitude she suffered severe nosebleed. On her return to Chicago in the third week in August she was aware of rather sudden loss of vision in the left eye, not accompanied by redness or pain. She came under observation the latter part of September. The black pathologic mass extended far forward into the vitreous, had a very sharp lower border, and appeared smaller than when first seen. Recently some coagulated blood clots had been seen floating about in the anterior vitreous. At the upper edge of the lesion bright red irregular-shaped hemorrhagic areas had been noted. The retina was definitely detached in the region above the pathologic area. The eye was not transilluminable in the area of the mass. There had been no melanin in the urine. Because of the history of frequent nosebleed in high altitudes, various blood tests were made from which it was found that there was no increase in bleeding time or clotting time, nor increase of platelets.

If the mass was a hemorrhage, the question as to location arose, whether a massive pre-retinal hemorrhage or a retrochoroidal hemorrhage. If it were a melanotic tumor, melanuria would probably be present. It might be a hemorrhage secondary to, and covering a tumor. The tension had always been normal. With the slitlamp the vitreous appeared very liquid and there were not many cells in the portion of the vitreous which it was possible to examine. Aspiration had been considered, but in view of the fact that the lesion seemed to be growing smaller, it was decided to wait. If this was a hemorrhage, in all probability it had coagulated by this time, and probably blood could not be secured with a needle.

The aging lens

Dr. Robert von der Heydt read a paper on this subject which will be published in this Journal.

Discussion. Dr. Hallard Beard asked whether Dr. von der Heydt had, in his experience, seen cases of incipient cataract in which there was not only an increase in refraction but also a return of accommodation, partial or complete, in semi-clouded lenses. He referred particularly to a patient past 70 years of age, with an incipient cataract which had reduced the vision to .6. It seemed that this eye did as well with distance correction as with any addition for

reading. The other eye required plus 2.50 added for reading. When first seen, he required plus 1.25 added for reading in the affected eye: later apparently no addition was required. With reference to the near point in cataract cases, it seemed that patients with early cataract preferred to hold print at 12 inches rather than 13½ or 14 inches. Was there any explanation of that?

Dr. Robert von der Heydt (closing) said that he had only seen such peculiar behavior as Dr. Beard described in aphakic eyes.

In reply to Dr. Allen, the rarity he described was called a lens with a double focus. The condition was only manifest when the pupil was dilated with a mydriatic. A definite smaller lens, though often somewhat cloudy, was seen within the lens. There might be a myopic center and an emmetropic or hyperopic periphery. The periphery was never in use, however, and the seeing was done through the center. These lenses with double foci were examples of extreme nuclear sclerosis.

A comparison of some drugs used for surface anesthesia in ophthalmology

Dr. John Bellows said that the following surface anesthetics were tested on the human cornea by means of von Frey's hairs. The order of effectiveness was determined from the surface area of the graphs formed by plotting the degree of anesthesia along the ordinates and the time in minutes along the abscissae. A word of caution was necessary; these results applied to the cornea and not necessarily to other mucous membranes and especially to infiltration anesthesia.

Order of Effectiveness	Comparative Cost	Time of Maximum Action	Duration in Minutes
1. Pantocaine ½%	20x	1 minute	13-14
2. Nupercaine 1-500	1x	5 minutes	16
3. Butyn 1%	10x	2 minutes	8
4. Cocaine 2%	5x	2 minutes	8
5. Phenecaine 1%	5x	2 minutes	7
6. Metycaine 2%	10x	2 minutes	5

Discussion. Dr. Philip A. Halper wished to comment on butyn. He had seen two cases of almost complete exfoliation of the superficial corneal epithelium following its use, both cases being of chalazia, where butyn was applied on a wad of cotton and left in contact with the chalazia for a few minutes. He had thought the exfoliation was due to trauma, until a conversation with Dr. W. W. Lewis of St. Paul, who stated that he had had similar experiences, and that in his opinion the butyn was responsible.

Dr. J. E. Lebensohn said that Dr. Bellows's data portrayed the relative effect of these agents in the usually advised concentration, but this did not give quite the true idea of their relative strength. When used in the same dilution, pantocaine was ten times as effective as cocaine. Pantocaine was superior to holocaine for taking the tension; it was less irritating and never produced any corneal encrustation. The prolonged action of nupercaine should commend it for the relief of pain in corneal ulceration, particularly if the drug, in effective form, could be incorporated in an ophthalmic ointment.

Dr. John Bellows (closing), in answer to Dr. Bothman's question on pantocaine, said that 2 percent pantocaine had produced clouding of the cornea, according to reports. He had used ½ percent; cocaine was used in 2 percent solution. The other drugs were used in the concentrations advised by the pharmaceutical houses. Of all the cocaine substitutes, butyn caused the slightest burning, holocaine the most. The others were about the same. With respect to cost, the pharmacist's cost to physicians was used.

Carcinoma of the meibomian gland

Dr. James Lebensohn read a paper on this subject which will be published in this Journal.

Discussion. Dr. Georgiana Theobald said that the fact that chalazia were

comparatively frequent should make this paper of interest in the differential diagnosis of this condition from carcinoma. Adelbert Fuchs in his Atlas on Histopathology of the Eye described a case of carcinoma of the lid in a man 74 years of age, which was mistaken for a chalazion. The tissue excised during the operation looked like dense granulation tissue. The patient was operated on a second time for chalazion; the tissue was then examined and found to be malignant.

Fortunately, carcinoma of the eyelid, especially of the meibomian gland, was rare. In reviewing all the cases of lid cancer at the Illinois Eye and Ear Infirmary since 1901, only one other case was found of carcinoma originating in the meibomian gland. On microscopic examination of the tumor removed in 1932 and the one removed in 1934 by Dr. Lebensohn, both showed similar pathologic findings: anaplastic undifferentiated epithelial cells of varying size were seen in alveolar formation between connective tissue septa; mitosis was very active, neoplastic giant cells were also found. Dr. Cutler had found that tumors of this type were amenable to radium.

Besides distinguishing these tumors from chalazia, it would seem desirable also to mention the basal-cell epitheliomas of the lids (basaliomata) of Krompecher, some cases of which had been reported by Panico. These tumors appeared also as nodules, grew slowly and rarely metastasized. Histologically, isolated nodules were found, sometimes being confluent and containing single or grouped cells in process of keratinization. Epithelial pearls were usually present. Panico believed that these tumors had a double origin from the basal layer of the epidermis and from the sebaceous glands.

Referring to treatment, this case incidentally showed the superiority of extirpation, followed by radium, to curetting in cases of suspicious looking chalazia. Although apparently metastases were infrequent, it might be well to use radium previous to operation. At the University of Liége Ophthalmic Clinic, epithelioma of the lids had been treated with radium regularly since 1925, and between 1925 and 1931 thirty-six cases of other forms of therapy. Lavorde believed that radium properly used was the ideal therapeutic agent, as it caused no deformity of the lids, no lesions of the globe and no late accident.

As Dr. Lebensohn had pointed out, although these tumors were rare (or perhaps only rarely discovered) care should be taken in removing all chalazia thoroughly, and whenever there was any suspicion, to have a pathologic examination.

Robert von der Heydt

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INTERMEDIATE EYE SERVICE

Last September, the Ophthalmological Society of New South Wales, composed of members of the local branch of the British Medical Association, inaugurated a "Medical Eye Service," intended for those people "who decline to go to public hospitals and who are unable to afford private fees."

The Service may be consulted by persons whose total family income does not exceed 260 pounds (about $1300.00) per annum. A comprehensive fee of about $3.75 is charged for (1) examination and prescription for glasses if required; (2) such advice prescription for drugs, and simple operative treatment as can be given at a single consultation; and (3) a report for the information of the general practitioner, if this is necessary. Further consulting treatment is given, if required, for the first four weeks at a rate of a little under two dollars a week, and afterward for a dollar and a quarter a week. Provision is also made for supplying glasses at greatly reduced prices.

Care of health, including care of the special sense organs, is a necessity and should be available to all, regardless of ability to pay for the services rendered. The so-called charitable institutions, including those maintained by municipalities or by national governments, are often attended by patients who not only can but prefer to pay something for what they receive, and who would be glad to escape the stigma which rightly or wrongly attaches to the acceptance of "charity," as well as avoiding the disagreeable personal contacts sometimes associated with attendance at popular clinics or hospitals.

It has often been argued that opportunity for the best medical care is limited to the two extremes of society, those whose ability to pay is relatively unlimited and those who can pay nothing. Organized provision is likely to be increasingly demanded for the lower middle classes.

In the United States, especially dur-

ing the worst part of the financial depression and before the advent of the "New Deal," sporadic attempts have been made to provide for this group of patients, mostly through so-called hospital associations. No doubt many blunders have been made and many lessons learned by the hospitals concerned as to the actuarial features of such arrangements and as to the facility with which abuses occurred. Of somewhat similar purpose is the plan which has been in effect for several years at the Pennsylvania Hospital, in the form of a pay clinic for those of moderate means.

At its Annual Representatives' Meeting last July, the British Medical Association formally recognized a definite plan for the establishment of provident associations for "persons of the middle and professional classes on a mutual insurance basis," in regard to institutional accommodation and related professional services.

The Notes officially approved on behalf of the British Medical Association (published in the British Medical Journal Supplement, October 6, 1934) insist that such provident associations should be organized on an insurance basis, and that care should be taken to maintain them actuarialy sound. Until a wide experience is available, the rates of contribution and the scales of charges for professional services and institutional care must be regarded as temporary.

It is suggested that the provident associations shall form area associations, with interavailability of membership and benefit, and that area associations shall be linked together by a national federation whose functions shall be mainly advisory and consultative. The governing body of a provident association should include representation of subscribing members, of hospital services, and of the medical profession.

The salary range suggested for those whom it is proposed to accept for such medical service is from about $1750.00 per annum for members without dependents to about $2500.00 for members with more than one dependent (with a slight addition for members within the London metropolitan area), and the corresponding rates of contribution are tentatively set at from slightly under ten dollars to fifteen dollars per annum. Of the total income available from members, it is estimated that rather more than one-half would be applied to medical fees.

Approval of such a scheme as that just described seems to involve recognition of the principle that for medical services each citizen should pay in proportion to his financial ability, the charge for a person of wealth being considerably higher than for a person of moderate means. In a much-regimented future it may be that such a variable scale of medical and surgical fees will be established under the law. At present it is certainly recognized for the most part only by those at the lower end of the scale!

It seems unlikely that the practice of medicine will ever be completely socialized, with each physician a servant of the state or municipality and every citizen entitled to medical service without other payment than that provided through taxation. But if such a situation does develop, the rich (if there remain any such) will still pay more for medical service than the poor, although they will make their payments in the form of taxes; and large sections of the community, paying no taxes, may receive their medical care gratuitously. The same arrangement already exists as regards public lighting, street cleaning, the elementary phases of education, and public libraries.

Most physicians are disposed to believe that such a degree of socialization would be harmful to society at large and destructive of medical science and efficiency, because lacking the stimuli that come from the personal relationships of private practice.

A somewhat terrifying picture of what may happen under medical socialization comes from Hungary, where emphatic protests by the national medical association as to medical fees under health-insurance regulations were met by a decree that all physicians who derived any kind of remuneration from the state must leave the association.

It is to be hoped that physicians will

not blind themselves to the necessities of the situation or to the unmistakable trend of modern thought and legislation. It is further to be hoped that they will apply their energies not merely to damming back the current but to shaping it in accordance with human need and reasonable professional interests.

As compared with the United States, the medical profession of Great Britain has the advantage of unified legislative and administrative control; while in the United States the whole problem of medical care is tremendously complicated by the constitutional relationship between the individual states and the federal government. Indeed, it may be wondered whether any adequate measure of health insurance, comparable to that in force in Great Britain, will ever be possible without an important amendment to the national constitution.

W. H. Crisp.

WHAT IS GLAUCOMA?

Glaucoma has been defined as increase of intraocular tension, with the causes and effects of that increase; a very good definition of the word. It is not certain that a better definition can be given today. It fixes attention on the central fact — increased intraocular pressure. But of the essential causes of such increase we still have only guesses, speculations, and unproved hypotheses.

Of the effects of glaucoma we have a large amount of evidence furnished by microscopic examination of eyeballs, functionally destroyed and too painful to be kept in the body. But of the physiology of intraocular pressure, and the balance of forces that should keep it within normal limits we know very little. Without such physiology we can form no plan for its rational early treatment.

The "successful" operations that have been done for glaucoma, scleral tapping, anterior or posterior sclerotomy, iridotomy, incision of the ciliary body, cyclodialysis, Lagrange sclerectomy, Elliot trephining, iris inclusion, or iridotasis, present a confused picture. It brings to mind the clinical remark: "Physicians who put medicines about which they know little, into bodies about which they know less, to cure diseases about which they know nothing." Knowledge of the effects of glaucoma has convinced all that it is a serious disease, that it is dangerous to neglect; but inclines one to think that little can be done to prevent the disastrous result. Without the stimulus of hope, we are not likely to put forth our best efforts.

Some cases of glaucoma recover without treatment, some reach a permanent recovery after the use of miotics. If these cases were all reported with the same minute detail as we use to report the pathologic changes in the eyes that have to be enucleated, glaucoma would not be regarded as always hopeless.

When a case does get well, it is apt to be regarded with doubt as to the permanence of the cure, or the correctness of the diagnosis. In the case of Laquer, glaucoma was held in check by miotics for more than five years; and then cure by operation gave good vision, which continued for more than twenty years, to the end of his life.

There is much to be learned about glaucoma, especially about its early history. In some parts of the world patients generally become blind in one eye, before coming to an ophthalmologist. Even in America, cases have been going on for years before a correct diagnosis has been made.

Recent studies in the physiology of intraocular pressure (Duke-Elder), show that there are striking variations in the pressure in normal eyes. The glaucoma attending epidemic dropsy in India was reported twenty-five years ago by Maynard, but has received little attention from the ophthalmologists of Europe, or America. The recent paper by Kirnan, of Calcutta, points out that this glaucoma occurs in young patients, sometimes under fifteen years of age. Treatment by excluding from the diet damaged rice that causes it, cures the dropsy. And this may be followed by spontaneous recovery from the glaucoma, even after weeks of high tension. The cases that recover without operation, spontaneously, or under miotics, are few, but they occur. The accurate,

early, and full reports of these cases, will give us a better knowledge of the true nature of glaucoma, than statistics of operative treatment, or detailed accounts of the degenerative changes that have gone on in the eyeball, after it has been functionally destroyed by glaucoma. They may give us a correct and practical answer to the question.

Edward Jackson.

RED-FREE OPHTHALMOSCOPY

From time to time an enthusiastic report appears on the use of red-free light in ophthalmoscopy. Since such reports do recur, the subject must be recognized by ophthalmologists as being of value.

Much harm has probably been done to the cause of this valuable diagnostic procedure by the existence of many poor red-free ophthalmoscopes. The usual red-free ophthalmoscopic view obtained is very disappointing; when the filter is swung into place, the result is similar to turning off the light.

Such is the red-free ophthalmoscopy most men have seen. Unfortunately it does not by any means give the picture that can be obtained. As with perception generally, the clearness of an object is determined not only by the quality of light but also very materially by the brightness of the light. When most of the ophthalmoscopic light is cut off, a very poor view is obtained; the remedy is of course more light.

"Light of selected radiation," the term which Jonas Friedenwald applies to the subject, is more inclusive than the term red-free light. Light of certain colors will give effects not obtained by white light. For instance, if a narrow band in the yellow part of the spectrum of adequate intensity is used, the blood vessels may be studied to best advantage. The blood columns and hemorrhages will appear black against a bright background, the light being similar to the natural color of the fundus. Light of this wave length also penetrates the retina readily and therefore leaves it invisible.

Besides sharpening the details by color contrast, the use of this light further enhances the distinctness of the image by the removal of chromatic aberration. With white light, the chromatic abberation of the human eye amounts to nearly two diopters between the two ends of the visible spectrum. Although this does not reduce visual acuity ordinarily, yet when the chromatic aberration of an observed eye is added to that of the observer's eye this factor becomes prominent. This fact is readily proved by the distinctness of details seen by monochromatic light.

Light of shorter wave lengths, towards the blue end of the spectrum, makes the retina visible so that one can actually see the retinal fibers. The practical importance of this fact was pointed out by Lauber in his paper on red-free ophthalmoscopy presented before the American Academy of Ophthalmology and Otolaryngology in September, 1934. He described a case of tobacco amblyopia with central scotomata. In one eye the retinal fibers to the macula were seen by red-free light to be intact, while in the opposite these fibers were absent. He predicted the return of central vision in the first eye; in a few weeks' time his prediction came true. Such a prognosis could be given only by an examination of this type, for field studies would be alike on the two sides, and the fundi would both appear normal in ordinary light.

It is to be hoped that Lauber's paper in the Proceedings of the Academy will stimulate the use of red-free light and further study of this subject. The method is to be used in addition to the ordinary ophthalmoscopy and must not be condemned until it has been tried with light of adequate intensity. The writer is using selected light with the binocular ophthalmoscope, and the views obtained are extraordinary.

H. Rommel Hildreth.

BOOK NOTICE

Physical Defects. The Pathway to Correction. American Child Health Association. Paper, 188 pages with tables and diagrams. New York, 1934.

This book has been prepared by a research staff of six workers, supervised

by an advisory committee of twelve, and financed by the Metropolitan Life Insurance Company. It deals with defects of vision, hearing, dental defects, nutrition, tonsillectomy, control of pediculosis, and health education. The investigation had the cooperation of the New York Department of Health and the Department of Education. Among the fifty names of those connected with the work we find the name of no ophthalmologist; but the most space is devoted to defects in acuity of vision. These doctors of public health, pediatricians, dental and tuberculosis specialists, health commissioners, school superintendents, principals, and teachers, rank visual defects as the most important. They seem to understand that the methods of our common school system are based on use of sight; that with lack of good vision the system is doomed to failure.

The book reports a study of methods discovering such defects, as practiced in New York Schools, and the pathway toward correction under best conditions. This includes choosing the children who have such defects by preliminary examination, or vision testing, follow-ups after conference of teachers, nurses and patients, and measurement and correction of defects. The preliminary examinations have shown more defectives than can be carried through to correction by the staffs provided. This has to be met by grading the defects discovered, and only correcting the worst and most urgent cases, and letting the others go without help. Among 5000 children of the 5th and 6th grades, 14 percent had 20/50 vision, or worse; and, of these, about one half were wearing glasses.

For each 100,000 children in the elementary schools, there were found 2700 teachers, 40 school nurses, and 7 school physicians. The practical deductions from the facts are that vision testing must be done by the teachers. The one nurse to 70 teachers can serve as a professional guide, or aid to the teachers. The one school physician to 6 nurses, 385 teachers, and 110,000 children, can deal only with the very worst defects that may be brought to his notice. Perhaps the problem of defective vision in the schools will first be mastered in small cities, or in rural schools.

Edward Jackson.

OBITUARIES

Dr. William Campbell Posey

When, on September 5, 1934, Dr. William Campbell Posey died at Naples, Italy, as he was about to return from a trip abroad, American ophthalmology lost one of its most distinguished members.

Born in Philadelphia on July 5, 1866, Dr. Posey, after graduation from the Episcopal Academy, entered the University of Pennsylvania, from which institution he received the degree of A.B. in 1886 and the degree of M.D. in 1889. At the University he was active in student affairs and his popularity brought to him the honor of being bowl man of his class.

After an interneship at the Presbyterian Hospital, Philadelphia, he studied abroad and developed close personal relations with many leaders in ophthalmology on the Continent and in England. Dr. Posey returned to Philadelphia and soon established a large practice both in private and hospital work. His untiring energy and keen clinical observations resulted in a large number of scientific contributions to ophthalmic literature. In addition he edited in conjunction with Dr. Jonathan Wright in 1903, "A Treatise on Diseases of the Eye, Nose, Throat and Ear." In 1906, in association with Dr. W. C. Spiller, he edited "The Eye and the Nervous System," writing the chapters on "Exophthalmic Goitre" and "The Psychologic Effects of Operations on the Eyes." Dr. Posey published a book on "Hygiene of the Eye" in 1918, and in 1931 wrote in conjunction with Dr. Samuel Horton Brown "The Wills Hospital of Philadelphia. The Influence of European and British Ophthalmology Upon It and the Part It Played in the Last Hundred Years in Developing Ophthalmology in America."

In 1919 failing health made it necessary for him to limit his activities, and

accordingly he resigned from his hospital and teaching positions. He retained, however, his interest in the many medical organizations to which he belonged. These included his local County Medical Society, in which he was Chairman of the Committee on the Conservation of Vision at the time of his death, and the Pennsylvania State Medical Society, of which he was a past Chairman of the Section on Eye, Ear, Nose and Throat. For many years he was an active contributor at the meetings of the Section on Ophthalmology of the American Medical Association, of which he was a past Chairman. He attended regularly and contributed frequently, until the last few years of his life, to the meetings of the Section on Ophthalmology of the College of Physicians of Philadelphia, and was a past Chairman of the Section. Dr Posey was for many years a member of the American Ophthalmological Society, and was its President in 1930, serving also as a member of its Council at the time of his death. He was a member of the American Academy of Ophthalmology and Oto-Laryngology, the Ophthalmological Society of the United Kingdom, and served as a member of the Board of Directors of the National Society for the Prevention of Blindness.

An energetic, forceful man, a generous and dependable friend, an untiring worker, a persistent student and ever alert observer, Dr. William Campbell Posey's death leaves his many friends keenly aware of their great personal loss, and creates a wide gap in the front ranks of American ophthalmology.

J. Milton Griscom.

December 31, 1934.

Dr. Victor Ray

Dr. Victor Ray was born June 28, 1866, in New York City. He was the son of Daniel Gano Ray and Josephine Weaver Ray. His parents and grandparents were residents of Cincinnati and took an active part in the early history of this city. His grandfather Joseph Ray was the last of the Presidents of Woodward College and it was he who wrote the series of Arithmetics, known as Ray's Arithmetic. One of his great grandfathers was Daniel Gano who was chaplain of the Revolutionary forces, and who baptised General Washington in the Potomac.

Dr. Victor Ray was taken as an infant to Europe, and he spent the first 16 years of his life in the various capitals of Europe. Upon returning to the United States he entered the Massachusetts Institute of Technology. After graduation in 1887 he took the position of Chemist of the Anaconda Copper Company, later becoming Manager and General Superintendent of that Company.

After 9 years in the engineering field, he returned to Cincinnati to begin the study of medicine. He graduated from Miami Medical School in 1897. His interneship was served in the old City Hospital. Following this he began the practice of Ophthalmology with his brother-in-law, Dr. Robert Sattler. In 1926 Doctor Ray was appointed Professor of Ophthalmology in the Medical Department of the University of Cincinnati, having previously served for a number of years as Assistant Professor of Ophthalmology. In 1926 he was elected President of the Academy of Medicine, which office he filled with distinction. He was a member of the staffs of the Good Samaritan and Ophthalmic Hospitals. He was a member of the American Medical Association and the Academy of Ophthalmology and Otolaryngology.

Doctor Ray was an expert in ophthalmic surgery. As a diagnostician he displayed excellent judgment, which was enhanced by his wide clinical experience. His opinions regarding treatment and operative procedures were highly valued by his colleagues and he was prompt to avail himself of methods advocated by others if they accorded with his discriminating judgment.

Possessed of great personal charm, Doctor Ray enjoyed a large practice and was beloved by his patients. His relations to them, to his students, and to his colleagues were characterized by the mildness, the courtesy, and the amiable kindness of the perfect gentleman and

physician. He was in truth, the natural product of a family devoted through generations to the best ideals.

Clarence King.

Dr. Manuel Menacho

On the 29th of September, 1934, one of the more conspicuous of Spanish ophthalmologists, Dr. Manuel Menacho, of Barcelona, passed away at the age of 74 years. With Dr. Santos Fernandez of Habana, he was the founder in 1900 of *Archivos de Oftalmologia Hispano-Americanos,* now in its 34th year of issue. At that time the writer's *Anales de Oftalmologia,* started in July, 1898, in Mexico City, was the only Journal especially devoted to ophthalmology published in the Spanish language. Dr. Menacho and Dr. Santos Fernandez had the courtesy to ask that the *Anales* be transferred to Spain, where its publication could be resumed on a larger scale, but many technical difficulties made the idea impossible. Both Journals continued publication separately, until the *Anales* were merged with the *American Journal of Ophthalmology,* when this was established in 1917.

In the year 1900, at the International Medical Congress held in Paris, Dr. Menacho with other important ophthalmologists, both from Spain and Latin America, founded the "Sociedad Oftalmologica Hispano-Americana,'" a very active society with a large membership, which since then has met every year in different cities of Spain.

After graduation in 1879, Dr. Menacho was a student of Wecker and Landolt in Paris, and then established himself in Barcelona, where he immediately built a large special practice. This was at a time when no specialists were available and the general surgeons performed all eye operations. Soon Dr. Menacho, with the aid of cocaine anesthesia and the new methods of antisepsis and asepsis, had a great success as an eye surgeon, and began an active career which ended only with his death. He was a conscientious observer and a prolific writer. All his articles reflect his accurate, scientific mind. He wrote of many subjects, especially of operations, tumors, glaucoma, etc. The collected clinical histories of his private Dispensary with many valuable critical data, were published in book form in 1923, under the title "Casuistica Clinica Iconografica."

In 1910 on the occasion of the 1st Centenary of the Argentine Republic, he was invited by the government of this country, as a member of the Spanish Committee of Honor, to give some lectures on eye diseases at the University of Buenos Aires. He was made an honorary member of the French Ophthalmological Society and belonged to many other eye organizations in several countries.

The writer had the good fortune of meeting Dr. Menacho during his stay in Barcelona last year and was delightfully entertained at his home by himself, Mrs. Menacho, and Edward Menacho, his nephew.

Spanish ophthalmology has suffered a distinct loss with the death of one of its pioneer and most active and progressive members.

Manuel Uribe Troncoso

CORRESPONDENCE

American Board of Ophthalmology

Jan. 1, 1935.

The American Board of Ophthalmology has conducted to date 46 examinations and has certificated 1,193 persons.

Examinations held during 1934.

Cleveland, June 11, for 23 candidates
Butte, Montana, July 17, for 16 candidates
San Francisco, July 24, for 16 candidates
Chicago, September 8, for 34 candidates
San Antonio, November 12, for 22 candidates

Because of the increased growth in the duties and activities of the Board, it has been thought wise to enlarge it by adding an additional representative from each of the three component national societies now represented. This will have the further advantage of insuring a larger attendance of the members of the Board at examinations and will make the duties, particularly in the matter of reading case reports, somewhat less arduous.

Accordingly, the three component societies represented on this Board, namely, the American Ophthalmological Society, the American Academy of Ophthalmology and Oto-Laryngology and the Section of Ophthalmology of the American Medical Association were petitioned to grant this increase in the Board and to elect an additional representative. This was done and the organization of the Board has changed in accordance with it. Members will be elected for a period of four years and no member will serve consecutively more than one full term.

The personnel of the Board at the present time is as follows:

AMERICAN OPHTHALMOLOGICAL SOCIETY:	Term ends:
Jos. L. McCool	Dec. 31, 1935.
Luther C. Peter	Dec. 31, 1936.
John N. Evans	Dec. 31, 1937.
Wm. H. Crisp	Dec. 31, 1938.
AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTO-LARYNGOLOGY:	
Thos. D. Allen	Dec. 31, 1935.
S. Judd Beach	Dec. 31, 1936.
Wm. H. Wilder	Dec. 31, 1937.
Everett L. Goar	Dec. 31, 1938.
SECTION ON OPHTHALMOLOGY, AMERICAN MEDICAL ASSOCIATION:	
Walter B. Lancaster	Dec. 31, 1935.
John Green	Dec. 31, 1936.
Edward C. Ellett	Dec. 31, 1937.
Conrad Berens	Dec. 31, 1938.

The American Board of Ophthalmology has joined with other special medical boards to form the Advisory Board for Medical Specialties. The following special Boards are represented:

American Board of Ophthalmology
American Board of Otolaryngology
American Board of Obstetrics and Gynecology
American Board of Dermatology and Syphilology
American Board of Pediatrics
American Board of Psychiatry and Neurology
American Board of Radiology

In addition to these special Boards the following organizations are also represented on this Advisory Board for Medical Specialties:

Association of American Medical Colleges
American Hospital Association
Federation of State Medical Boards of the U.S.A.
National Board of Medical Examiners

One of the functions of this Advisory Board is to coordinate the efforts of the individual special boards in proposing courses of graduate instruction in universities and medical colleges equipped for training medical specialists.

It is hoped that through its Council on Medical Education and Hospitals the American Medical Association may recommend certain courses of instruction and periods of clinical training looking to the development of higher qualifications for specialists in the various subjects of medicine.

The American Board of Ophthalmology is represented on this Advisory Board for Medical Specialties by Doctors Walter B. Lancaster and William H. Wilder who attended the meetings devoted to its organization. The first meeting of this Advisory Board was held June 10, 1934, at Cleveland when its organization was completed and its constitution and by-laws were adopted.

A new directory of persons who hold the certificate of the American Board of Ophthalmology is now in press and will be ready for distribution about February 1 of this year.

The following persons were granted the certificate of the Board during 1934:

Alexander, Chas. S., Houston, Tex.
Allen, Donald G., Cleveland, Ohio.
Appelbaum, Alfred, New York, N.Y.

Barnes, Lancelot S., Toronto, Ont., Canada.
Beck, Robt. J., Saranac Lake, N.Y.
Bellows, John, Chicago, Ill.
Bentley, Frederick C., Seattle, Wash.
Berman, Philip G., Lowell, Mass.
Best, L. K., Fall River, Mass.
Billings, Robt. J., Pittsburgh, Pa.
Billingsley, John A., Kansas City, Kan.
Bourne, Malcolm G., Jamestown, N.Y.
Boyle, S. F., San Francisco, Calif.
Brandenburg, Kenneth C., Long Beach, Calif.
Brannin, Daniel, Dallas, Tex.
Bressler, J. L., Chicago, Ill.
Brumbaugh, John D., Akron, Ohio.

Cady, Frederick J., Saginaw, Mich.
Calcote, Royal J., Little Rock, Ark.
Cameron, Walter C., Tacoma, Wash.
Cecha, A. H., Quantico, Va.
Chapman, Katharine H., Chicago, Ill.
Colgin, Wm. E., Waco, Tex.
Conboy, John E., New York, N.Y.
Cox, Kelly L., Dallas, Tex.
Crage, Francis M., Chicago, Ill.

Davis, Leo L., Denver, Colo.
Dean, Abbott M., Council Bluffs, Iowa.
Dickey, C. Allen, San Francisco, Calif.
Dillon, Elmo E., Chicago, Ill.
Duggan, Walter F., New York, N.Y.

Farrell, Jas. I., Utica, N.Y.
Fellows, Manley F., Duluth, Minn.
Fink, Otto E., Danville, Ill.
Fletcher, Thomas A., Kansas City, Mo.

Gabriels, J. A. C., Albany, N.Y.
Givner, Isadore, New York, N.Y.
Goodall Edw. B., Boston, Mass.
Goray, James P., Fitchburg, Mass.
Granger, Wayne B., Emporia, Kan.
Gray, Leon F., Shreveport, La.
Gunderson, Trygve, Boston, Mass.

Haire, Paul G., Malden, Mass.
Hallum, Alton V., Atlanta, Ga.
Harner, Clyde E., Long Beach, Calif.
Harrington, David O., San Francisco, Calif.
Hendershott, H. M., Portland, Ore.
Hicks, Avery M., San Francisco, Calif.
Hilgartner, Henry L., Jr., Austin, Tex.
Hill, Clarence E., Toronto, Ont., Canada.
Hitz, John B., Milwaukee, Wis.
Hory, Jos. S., New York, N.Y.
Houlahan, James M., Mt. Vernon, N.Y.
Howe, Spencer S., Bellingham, Wash.
Hunt, Guy A., Butler, Pa.

Irvine, Robt. S., San Francisco, Calif.
Ingalls, Raymond G., Berlin, N.H.

Jeançon, Etta C., Los Angeles, Calif.
Johnson, W. R., Norfolk, Va.

Katz, Dewey, Chicago, Ill.
Keckich, Thos. D., Gary, Ind.
Keeler, Lansing, Jamaica, N.Y.
Keil, Frank C., New York, N.Y.
Kershner, Warren E., Bath, Me.
Kilgore, Geo. L., San Diego, Calif.
King, Merrill J., Boston, Mass.
Knauer, Wm. J., Jacksonville, Fla.
Koller, Herman M., Minneapolis, Minn.

Leahey, Brendan D., Lowell, Mass.
Leinfelder, P. L., Iowa City, Iowa.
Lees, Chas. R., Fort Worth, Tex.
Little, Herman C., New Haven, Conn.
Little, Milton F., Hartford, Conn.
Lowry, Blackburn W., Tampa, Fla.
Lyon, Mortimer, Toronto, Ont. Canada.

Macnie, John P., New York, N.Y.
Maisler, Sol, San Francisco, Calif.
Maxwell, Harvey C., Presidio of San Francisco, Calif.
McAuley, A. G., Montreal, Que., Canada.
McCaslin, Murray F., Pittsburgh, Pa.
McCoy, Carroll A., Los Angeles, Calif.
McCullough, M. K., Dallas, Tex.
McLeod, John, Kansas City, Mo.
Mesirow, Maurice E., Chicago, Ill.
Miller, G. Leslie, Lakewood, Ohio.
Morse, Ashley W., Butte, Mont.
Muldoon, W. E., San Antonio, Tex.
Mullen, Clifford J., Kansas City, Kan.
Murphy, Edw. S., Missoula, Mont.

Nethercut, Glenn W., Chicago, Ill.

Ohmart, Walter A., Denver, Colo.
O'Reilly, B. E., St. Paul, Minn.

Palmer Bascom W., Salt Lake City, Utah.
Paton, R. T., New York, N.Y.
Pfeiffer, Raymond L., New York, N.Y.
Post, Winfred L., Joplin, Mo.
Potter, Peter, Butte, Mont.

Quinn, Lester H., Dallas, Tex.

Ralston, Frank L., LaGrande, Ore.
Rathgeber, Van Doren, Fort Worth, Tex.
Riker, Aaron D., Pontiac, Mich.
Robertson, Gaynelle, San Francisco, Calif.
Rodin, Frank H., San Francisco, Calif.
Row, D. Hamilton, Indianapolis, Ind.
Ruggles, R. H., Boston, Mass.

Schaub, Carl F., Chicago, Ill.
Schuster, Stephen, El Paso, Tex.
Shapira, Theo. M., Chicago, Ill.
Sheppard, Ernest, Washington, D.C.
Siegel, F. X., Cincinnati, Ohio.
Smith, Dennis V., Long Beach, Calif.
Smith, H. Gordon, Palo Alto, Calif.
Sowers, Alva B., Chicago, Ill.
Sparber, Herman, Brooklyn, N.Y.
Spitze, Edw. C., East St. Louis, Ill.
Statti, Louis W., Pittsburgh, Pa.
Stephens, B. M., Alameda, Calif.
Stough, John T., Chicago, Ill.
Struble, Gilbert C., St. Louis, Mo.
Swick, David A., New York, N.Y.
Swigert, John L., Denver, Colo.

Tindal, John M., Chicago, Ill.
Trull, Alfred C., Haverhill, Mass.
Turtz, Chas. A., New York, N.Y.

Vandevere, Wm. E., El Paso, Tex.
Van Lammers, Harold, Flushing, N.Y.

Whalman, Harold F., Los Angeles, Calif.
Wheeler, John M., New York, N.Y.
Wilson, Cliff C., Pampa, Tex.
Wilson, Clinton, Monterey, Calif.
Woodruff, Harry W., Joliet, Ill.

William H. Wilder.

Sugar Treatment of Trachoma

Dec. 13, 1934

A recent case of trachoma successfully treated with sugar revives an interest I have had in the subject for many years. About nine months ago an insurance man brought his son aged 10 years to me because of trachoma. A competent ophthalmologist some fifty miles away had been treating him without benefit.

Follicles were present in palpebral and bulbar conjunctiva with usual accompanying photophobia. I told the father that I proposed to treat his son's eyes with sugar. After telling him of my experience with that treatment for more than thirty years he agreed to it but said that it would not do to let his wife know about it. He was confident that if his wife knew that she was using powdered sugar and syrup in the boy's eyes that she would have no faith in it and would neglect its use.

The boy's eyes gradually improved and in four months he was able to return to his school. The sugar treatment for trachoma is not original with me. Dr. A. Oshana, a practicing physician here, who was born and raised in Persia, told me about it more than thirty years ago and I have been successful with this treatment in every patient I have had since that time.

As trachoma is not prevalent in this part of Iowa the number I have treated has not been large. About thirty years ago I wrote an account of it to Casey A. Wood, then editor of the Ophthalmic Record, which he published. Whether anyone ever tried it out I do not know, at least I have seen nothing about it in

ophthalmic literature since. I have often wondered if many oculists might not be as skeptical about it as was the insurance man's wife, and not give it a fair trial.

The treatment as given to me and as I invariably used it is to cocainize the tissues after instilling a few drops of adrenalin, then break up the follicles with the slightly sharpened point of a hard lump of granulated sugar, having a half dozen prepared before starting. The sugar absorbs the blood, obviating the necessity of sponging, thereby keeping the surface clear to go from one follicle to another. As each lump of sugar becomes saturated it is laid aside and a fresh one taken.

During the first few years of my ophthalmic practice a few trachoma cases were the bane of my life, when we used Knapp's roller forceps, blue stone and tannic acid with glycerine. I should be interested to know whether any oculist has given this treatment a good trial in a community where trachoma is prevalent.

Frank G. Murphy

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

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1. GENERAL METHODS OF DIAGNOSIS

Abramovicz, I. **Combined focal illumination and transillumination in biomicroscopy of the eye.** Klinika Oczna, 1934, v. 12, pt. 2, p. 271.

Transillumination illuminates the background, and with combined illumination it is possible to see the finest changes and determine their position relative to corneal depth. (Illustrations.) Ray K. Daily

Aliquò-Mazzei, A. **Physiologic anisocoria associated with lateral movements of fixation.** Rassegna Ital. d'Ottal., 1934, vol. 3, July-Aug., p. 524.

Physiologic anisocoria associated with lateral movements of fixation was first described a few years ago by Tourney. The phenomenon is sometimes called the "reaction of Tourney." With fixation of a point situated directly in front there is symmetric contraction of the pupils, but with fixation of a near object situated at one side there results miosis only of the adducted eye. Aliquò-Mazzei, who studied several thousand subjects, concludes that the phenomenon should be ascribed to active dilatation of the pupil through excitation of a particular cortical center of the hemisphere opposite the side toward which deviation occurs. Eugene M. Blake.

Berens, C., Kern, D., and Payne, B. F. **A tangent screen with artificial daylight illumination.** Trans. Amer. Acad. Ophth. and Otolaryng., 1933, 38th annual meeting, pp. 417-428; also Amer. Jour. Ophth., 1934, v. 17, Sept., p. 826.

Fralick, F. B. **The Kahn reaction in the aqueous humor.** Trans. Amer. Acad. Ophth. and Otolaryng., 1933, 38th annual meeting, pp. 200-211. (See Amer. Jour. Ophth., 1934, v. 17, April, p. 364.

Gjessing, H. G. A. **Diagnosis of diseases of the eye. Value of the history and spontaneous statements of the patient.** Arch. of Ophth., 1934, v. 12, Sept., pp. 330-344.

The author discusses the most characteristic symptoms of diseases of the eye under the topics of pain as found in superficial conditions, deep-seated inflammation, and glaucoma; asthenopia; conditions with migraine-like symptoms; sudden loss of vision; chromatopsia; diplopia and polyopia; cataract and changes in the vitreous, choroid, and retina; and foreign bodies. The article contains many valuable personal observations and case reports demonstrating how wrong diagnoses resulted from insufficient attention to the history and behavior of the patients.

J. Hewitt Judd.

Mayer, L. L. **Use of the fundus colorimeter.** Arch. of Ophth., 1934, v. 12, Aug., pp. 228-233. The author summarizes the results obtained by use of the fundus colorimeter of Cohen in persons with various conditions, but especially multiple sclerosis, paresis, syphilitic optic atrophy, syphilitic meningitis, and tabes. Normal values were established for the various types of refractive error. Field changes do not always correspond to the colorimeter findings. Several modifications are recommended for the instrument. J. Hewitt Judd.

Roasenda, G. **A pathological pupillary light reflex.** Rassegna Ital. d'Ottal., 1934, v. 3, July-Aug., p. 490.

Roasenda describes two cases of early Argyll Robertson pupil with unusual light reflex. The pupil is of normal diameter in daylight and it dilates with lowered illumination, but presents noticeable irregularity in shape, when a beam of light is thrown upon it. After a moment the pupil again becomes round. The irregularity is due to different rates of reaction of different sectors of the iris, probably caused by lymphocytic infiltration of the ciliary ganglion. The phenomenon is present before the more commonly known sign of Argyll Robertson is apparent.

Eugene M. Blake.

Robertson, C. J. **Measurement of the speed of adjustment of the eye to near and far vision.** United States Naval Med. Bull., 1934, v. 32, July, p. 275.

In the interest of aviation the author presents a study of three test groups with the tachistoscope. With this instrument the eyes are required to shift from a near object on the left to a far object in the median plane and then to return to a near object on the right. Speed of accommodation for near and far and speed of coördinated eye movement are thus measured, as well as speed of reaction.

Edna M. Reynolds.

Roemheld, L. **Concerning reflex pupillary rigidity.** Deut. med. Woch., 1934, Oct. 12, p. 1541.

After skull injuries the reflex pupillary immobility occurring in rare cases is not exactly the same as that seen in classical reflex rigidity. Posttraumatic reflex pupillary rigidity is often unilateral, there is no miosis, and the convergence reaction is weaker.

Theodore M. Shapira.

Spaeth, E. B. **Clinical determination of light threshold.** Trans. Amer. Acad. Ophth. and Otolaryng., 1933, 38th annual meeting, pp. 170-194. (See Amer. Jour. Ophth., 1934, v. 17, Aug., p. 769.)

Tristaino, L. **Action of hephetonin on the eye.** Boll. d'Ocul., 1934, v. 13, Feb., pp. 229-260.

The writer studied the action by instillation and by subconjunctival injection, on the rabbit and the human pupil. The drug had a rapid mydriatic action, more so if injected. The mydriasis is attributed to irritation of the sympathetic endings. The effect in early age is very slight. In full dilatation the direct photomotor reflex is abolished, the consensual is slightly affected, and accommodation is not affected. Pilocarpin contracts the pupil from full dilatation in a few minutes. Atropin or homatropin does not increase the dilatation. The drug increases the intraocular tension slightly, and increases the glycohydric percentage. Because of its short mydriatic action it can be used for ophthalmoscopic examination. (Bibliography.) M. Lombardo.

Von der Heydt, R. **The new Zeiss-Comberg slitlamp.** Trans. Amer. Acad. Ophth. and Otolaryng., 1933, 38th annual meeting, p. 432.

This new instrument is a small and compact unit which can be placed on any table. George H. Stine.

Wentworth, H. A. **The tangentometer. A new, portable instrument for charting tangent screens at various distances.** Arch. of Ophth., 1934, v. 12, Sept., pp. 403-406.

The instrument consists of five bakelite rules perforated at five-degree intervals for distances of 16.6, 33, 50,

100, and 200 cm. respectively, with an oval disc attached to each of correct size and location for the blind spot. With the accompanying protractor any black screen may be transformed into a tangent screen. (Drawings.)

J. Hewitt Judd.

2. THERAPEUTICS AND OPERATIONS

Gasparro, U. **The penetration of drugs into the anterior chamber.** Rassegna Ital. d'Ottal., 1934, v. 3, July-Aug., p. 563.

The author studied the rapidity of penetration of several drugs into the anterior chambers of dogs and rabbits, by corneal and conjunctival application. Atropin penetrated rapidly, producing mydriasis three minutes after instillation. Eserin passed more slowly, miosis resulting only after fifteen minutes. Adrenalin required twenty-five minutes to produce dilatation. Strychnin was found in the aqueous in ten minutes.

Eugene M. Blake.

Koller, C. **Preliminary report on local anesthesia of the eye.** Arch. of Ophth., 1934, v. 12, Oct., pp. 473-474. (See Section 18, Anatomy and embryology.)

Law, F. W. **The present position of ultraviolet therapy in eye disease.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 201.

The author concludes that ultraviolet therapy is most valuable in phlyctenular disease and as a general tonic; that it is of great benefit in interstitial keratitis; and that, excluding very small children, the younger the patient the better the response. Beulah Cushman.

Lebensohn, J. E. **The nature of photophobia.** Arch. of Ophth., 1934, v. 12, Sept., pp. 380-390.

Previous theories are summarized and the fact that photophobia cannot occur without functional integrity of the optic and trigeminal nerves is confirmed by personal observations of cases and experimental data. Vasodilatation induced by the trigeminal reflex is the sensitizing factor that makes the normal pupillary reaction a painful response, and is as essential in the production of photophobia as are vision, oculomotor function, and sensation. Hence instillation of epinephrin should be added to cycloplegics and sedatives as a rational therapeutic measure.

J. Hewitt Judd.

Martin, Philippa. **The effects of irradiation of the eye by radium.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 246.

After two years' observation the author gives a preliminary report of thirty-four cases of malignant tumor in the neighborhood of the orbit treated by interstitial irradiation with radium. The needles varied in content of radium element from 0.6 to 3.0 mg. The screen varied from 0.5 to 0.8 mm. Pt. The needles were usually in place for ten days. Incidental tissue damage in conjunctiva, puncta, lashes and eyebrows, and crystalline lens is described. No clinical evidence has been found that the retina or the other eye is damaged by radium. Beulah Cushman.

Mazzi, L. **Concerning passage into the eyes of alcohol injected intravenously.** Arch. di Ottal., 1934, v. 41, April-May, p. 212.

Rabbits tolerated thirty-three per cent alcohol solution up to 7 c.c. per kilogram of body weight. The maximum amount appeared in the eye fifteen minutes after injection. The amount remained constant for one hour, after which there was gradual diminution, and in eight hours there was only a minimal trace.

Experiments also were made to determine the relationship between the amounts of alcohol in the blood, vitreous, and crystalline lens.

H. D. Scarney.

O'Brien, C. S. **Local anesthesia.** Arch. of Ophth., 1934, v. 12, Aug., pp. 240-253.

This review points out the indications and advantages of local anesthesia, and describes the drugs and methods of administration and resulting anesthesia obtained by instillation, local applica-

tion, and injection. The author's method of akinesis is described and is illustrated by a drawing. The methods used for various operations are outlined.

J. Hewitt Judd.

Pisani, M. **Sulphur therapy.** Lettura Oft., 1934, v. 11, Sept., p. 461.

Simple and pustular blepharitis associated or unassociated with conjunctivitis, trachoma with or without pannus, central leucoma, rheumatic and specific iritis, and incipient cataract were treated with sulphur locally, orally, subconjunctivally, and intramuscularly. Blepharitis cases treated locally with vaporizations and ointment, in addition to sulphur intramuscularly, were cured. Some responded as well with sulphur by mouth. Transient slight local irritation in some was controlled by instillations of holocain in three percent solution.

In trachoma with pannus, treated by local applications of silver nitrate and either intramuscular or subconjunctival injections of bismuth, the benefit was attributed to the disinfectant action of small traces of sulphuretted hydrogen. Subconjunctival therapy in incipient cataract produced no change. (Bibliography.)

F. M. Crage.

Santoni, A. **Experimental researches on the possibility of introducing neosalvarsan in ocular tissues by iontophoresis.** Boll. d'Ocul., 1933, v. 12, Dec., pp. 1469-1482.

In rabbits, the author applied the positive electrode to the back of the neck and the negative, with a one percent neosalvarsan solution, to the eye, for from ten to forty minutes. Eyes so treated were enucleated, fixed in formalin, and sectioned the next day. The neosalvarsan penetrated the anterior third of the cornea. (Bibliography.)

M. Lombardo.

Stallard, H. B. **The effects of radium emanations in certain selected diseases of the eye.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 224.

Sarcoma of the uveal tract and glioma of the retina, on account of their highly cellular nature, sparsity of their intercellular stroma, and embryonic type of cells, are very radiosensitive. Three treated cases of sarcoma and two of glioma are reported. In these cases the interstitial method of inserting the radon seed was more effective than suturing the seeds to the sclera.

The following complications were noted: temporary or permanent loss of eyelashes and eyebrows, erythema of the lids, conjunctival burns, necrosis of the cornea, vacuolation of lens fibers, posterior cortical cataract, and panophthalmitis. (Illustrated.)

Beulah Cushman.

Wheeler, J. M. **Principles of modern surgery in ophthalmology.** Trans. Amer. Acad. Ophth. and Otolaryng., 1933, 38th annual meeting, p. 55.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Abraham, S. V. **Amblyopia: a classification with a report of cases.** Arch. of Ophth., 1934, v. 12, Sept., pp. 391-402.

Basing on a study of 1400 patients, amblyopia is classified as congenital and acquired and the latter group is subdivided into passive suppression (ametropic), bilateral and unilateral (squint). Mixed cases also exist in which one form of amblyopia is superimposed on another. Passive suppression results from a lack of opportunity of the eye to function fully because of lack of correction, or late correction of a refractive error which is most frequently astigmatism of more than 2 D. Active suppression occurs when binocular fixation results in discomfort or confusion or when it is undesirable or impossible for other reasons. Refractive errors may not be a factor in this form but strabismus seems to be definitely related. Early detection and correction of congenital defects and refractive errors are urged to prevent amblyopia and to restore the function of amblyopic eyes. (Eighteen case reports.)

J. Hewitt Judd.

Adler, F. H., and Fliegelman, M. **Influence of fixation on the visual acuity.** Arch. of Ophth., 1934, v. 12, Oct., pp. 475-483.

From experiments conducted to determine how accurate fixation is when a constant pattern (cross-hair) is looked at, or when a displacement in a part of a line is being examined, it was established that the eyes are in constant motion. Three types of movements occur in the horizontal plane: rapid shifts, waves, and fine vibratory movements. It is suggested that the purpose of this is to carry the image over a relatively large number of cones into the fovea. The article is illustrated by a diagram of the apparatus and electrocardiographic records of the movements.

J. Hewitt Judd.

Andrija, C. **Experimental studies of the influence of the ocular muscles and conjunctiva on growth and refraction of the eye.** Klinika Oczna, 1934, v. 12, pt. 2, p. 243.

In fifteen rabbits, from five to eight weeks old, the author severed the external ocular muscles, with the exception of the rectus internus, and separated the conjunctiva from the limbus, except for a small nasal bridge. In two cases of this severe insult to the eye the cornea became opaque. The diameter of the cornea was measured and the refraction determined by skiascopy. The outcome was that the operated and control eyes grew similarly in size and refraction. The author concludes that the external ocular muscles have no influence on the development of the eyeball and have no part in the development of myopia. Ray K. Daily.

Belotte, M. **Traumatic myopia.** Arch. d'Opht., 1934, v. 51, Oct., p. 662. (See Section 16, Injuries.)

Cowan, A. **Some factors concerned in the correction of aphakia.** Arch. of Ophth., 1934, v. 12, Oct., pp. 571-579.

The importance of proper adjustment of the lens as to centration, plane with respect to the visual line, and distance from the eye are stressed. The author suggests a lens with a +14.00 spherical front as being a good model. (Discussion.) J. Hewitt Judd.

Creed, R. S. **After images.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 466.

A number of interesting experiments with after images are described.

Beulash Cushman.

Dymshitz, L., and Barbel, I. **The dark adaptation curve and the deviating eye in concomitant strabismus.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 6, p 600. (See Section 4, Ocular movements.)

Ferree, C. E., and Rand, G. **The testing of visual acuity. 3. Types of test field and a projection apparatus.** Amer. Jour. Ophth., 1934, v. 17, Dec., pp. 1147-1150.

Fry, G. A. **Depression of the activity aroused by a flash of light by applying a second flash immediately afterward to adjacent areas of the retina.** Amer. Jour. Physiology, 1934, v. 108, June, p. 701.

A description of the apparatus and method used to investigate the interaction of adjacent areas of the retina is given. The following facts are demonstrated: (1) The activity aroused by a flash of light may be depressed by applying a second flash immediately afterward to adjacent areas of the retina. (2) The depressive effect increases as the interval increases. (3) A decrease in duration corresponds to a decrease in intensity. (4) The depressive effect diminishes as the distance between stimulated areas is increased.

Edna M. Reynolds.

Granit, R., and Therman, P. O. **Inhibition of the off-effect in the optic nerve and its relation to the equivalent phase of the retinal response.** Jour. of Physiology, 1934, v. 81, July 31, p. 47.

Experimental investigations show that the first effect of a flash of light upon the retina is inhibition of activity in the optic nerve. This is followed by renewed activity in the nerve. Retinal potentials of opposite sign are found to be associated with the opposite effects of excitation and inhibition.

Edna M. Reynolds.

Hay, P. J. **Hinged perforated diaphragms for the trial frame.** Brit. Jour. Ophth., 1934, v. 18, Nov., p. 652.

To the trial frame is hinged a perforated diaphragm which leaves the cells free to hold lenses and avoids obscuration of the axis markings.

D. F. Harbridge.

Hofe, K. **Further investigation of the electric excitability of the light-adapted human eye.** Arch. f. Augenh., 1933, v. 108, Dec., p. 241.

The author used the method described by Achelis and Merkulow (Zeit. f. Sinnesphysiol., 1929, v. 60, p. 95).

In this short paper the writer reports an increase in the threshold by increase in the amount of light, and a decrease in the threshold by decrease in the amount of light. The paper does not lend itself to abstract. (Tables, curves.)

Dohrmann K. Pischel.

Isakowitz, J. **A basic objection to the accommodation theory of Pflugk.** Klin. M.f. Augenh., 1934, v. 93, Aug., p. 196.

Isakowitz maintains that the Tscherning-Pflugk theory cannot be reconciled with the accommodation of the senile eye, which the Helmholtz theory fully explains. According to Helmholtz the lens action is positive and fails as soon as lens elasticity is lost. For Pflugk the lens is a passive object which yields at least partially to contraction of the ciliary muscle. The dilemma for Pflugk's theory is thus stated: Either the ciliary muscle must contract maximally to attain the near point, in which case the effortless near work of senile eyes is inexplicable; or the ciliary muscle acts as in the young, in which case the reserve accommodation would have to be able to influence the near point. C. Zimmermann.

Kerry, Richard. **Macular aberration and the reversal of the macular curvature.** Canadian Med. Jour., 1934, v. 31, July, p. 32.

The curvature of lines passing through the macula is shown to be due not to the general curvature of the eyeball as stated by Helmholtz, but to aberration resulting from inequalities in the retina at the macula. The fact that lines passing beyond the macula show no curvature is explained as perhaps being due to the fact that this part of the retina is not supplied by the macular bundle. Reversal of macular curvature which occurs when attention is directed to some plane away from the fixation point is explained as due to contrast and disturbance of relativity.

Edna M. Reynolds.

Lence, Sal. **Can the astigmatism of the crystalline lens be measured objectively?** Ann. d'Ocul., 1934, v. 171, Sept., pp. 778-781.

The author recalls the phenomenon of Purkinje images and studies the projection of the slitlamp image on the lens surfaces. He is able to show a short broad reflection in one meridian and a long thin light in the opposite meridian.

H. Rommel Hildreth.

McCool, J. L. **Cataract test lenses.** Trans. Pacific Coast Oto-Ophth. Soc. 1933, 21st annual meeting, p. 171.

In the refraction of cataract patients, the author uses meniscus instead of biconvex lenses, finding the former more exact and more adaptable to a position 14 mm. in front of the cornea.

Edna M. Reynolds.

Motolese, A. **Surgical treatment of high myopia.** Boll. d'Ocul., 1933, v. 12, Nov., pp. 1173-1297.

The author describes the technique of the operation for high myopia as done by Bardelli at the University of Florence. It consists in a large discission of the anterior capsule and the anterior cortical substance, followed four or five days later by aspiration of the opaque lens matter with a common hypodermic syringe. The aspiration is repeated some time later if remnants of opaque lens matter become visible. (Extensive bibliography.) M. Lombardo.

Obrig, T. E. **The "myodisc" lens and bifocal lens.** Arch. of Ophth., 1934, v. 12, pp. 235-237.

The lens is a flat, plano, or cylindric lens with a 20 to 25 mm. concave disc

ground in the center. The higher power lenses have the smaller discs. The bifocal is made by grinding a separate smaller concave disc, with an independent optical center, below the first so that its upper part extends into the upper disc and produces a knife-edge division which eliminates aberration. (Illustrated.) J. Hewitt Judd.

Peckham, R. H. **Foveal projection during ductions.** Arch. of Ophth., 1934, v. 12, Oct., pp. 562-566.

The experiments were conducted with a special stereoscope on which two telescopes were placed so that they could be moved and focused on the subject's eyes, allowing an accurate estimate of the position of the eye and hence of the fovea. It was found that the foveae were not always under the images of the object of regard during binocular fixation, especially in positions assumed during ductions. It is thought that images fused at unequal distances or on opposite sides of the fovea may have been fused by perception rather than by the anatomic neural structure. J. Hewitt Judd.

Vita, A. **The intolerance of some high hypermetropes to meniscus lenses.** Rassegna Ital. d'Ottal., 1934, v. 3, Sept.-Oct., p. 753.

Vita shows by formulae and graphs the difference in size of the images formed by lenses of high plus power of meniscus and biconvex types. Those constructed according to the curves of Tscherning-Ostwalt produce a forward displacement of the posterior principal point, producing enlargement of the retinal image equal to that which would be made by a biconvex lens nearly fifty percent stronger. The author thinks this is the reason why some ametropes prefer the biconvex type of lens to the meniscus. (Two illustrations.)

Eugene M. Blake.

Vittadini, A. **The surgical treatment of high myopia.** Rassegna Ital. d'Ottal., 1934, v. 3, July-Aug., p. 607.

Vittadini reports one case of successful extraction of both lenses in high myopia and reviews the subject thoroughly. He states various conclusions. Patients must be between sixteen and thirty years old. The optimum degree of myopia is between nineteen and twenty-five diopters. Fundus lesions should not reduce vision to below one-tenth of normal. The most favorable method of operation is discission of the capsule, followed in a few days by linear extraction. The results obtained are improvement of vision, loss of accommodation, marked improvement in the nutrition of the globe, with arrest of elongation and, in young individuals, possible development of some accommodation. Both eyes may be operated upon, fundus lesions are not a contraindication, and the percentage of retinal separation is not greater than in non-operated cases of high myopia.

Eugene M. Blake.

4. OCULAR MOVEMENTS

Barigozzi, C. **Dominance and recessiveness of nystagmus.** Rassegna Ital. d'Ottal., 1934, v. 3, Sept.-Oct., p. 733.

Barigozzi discusses nystagmus in one family of four generations. The first individual was a mother with nystagmus and head trembling as a dominant trait, married to a normal husband. One daughter showed the same condition. The brothers in the second generation were normal. From this point the nystagmus comported itself as a recessive. In the third generation were three children, two being males who showed nystagmus, astigmatism, and head trembling. Thus in this family tree nystagmus associated with head trembling was dominant in two generations and for two generations was recessive.

Eugene M. Blake.

Bielschowsky, A. **Divergence excess.** Arch. of Ophth., 1934, v. 12, Aug., pp. 157-166. (See Amer. Jour. Ophth., 1934, v. 17, June, p. 558.)

Corrado, M. **On the inconstancy of the relationship between the degree of deviation and the optico-functional condition in concomitant strabismus.** Ann. di Ottal., 1934, v. 62, Oct., p. 817.

The author studied this problem in one hundred cases. The great variability in results found was not explained by any present-day hypothesis, and the author thinks an important causative element may be a difference in the size of the maculae in the same individual. The greater the difference in extent of the two maculae, the greater will be the deviation. (Bibliography.)

Park Lewis.

Dymshitz, L., and Barbel, I. **The dark adaptation curve of the deviating eye in concomitant strabismus.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 6, p. 600.

With the Nagel adaptometer the authors tested the dark adaptation of both eyes in twenty-five cases of concomitant strabismus. The central vision of the deviating eyes was much reduced. The resulting curves show delayed adaptation of the fixing eye in comparison with the deviating eye and the perfect dark adaptability of the deviating eye. It seems that central fixation serves as a brake in retarding the dark adaptation of the fixing eye.

Ray K. Daily.

Guibor, G. P. **The possibilities of orthoptic training.** Trans. Amer. Acad. Ophth. and Otolaryng., 1933, 38th annual meeting, pp. 214-222; also Amer. Jour. Ophth., 1934, v. 17, Sept., p. 834.

Hosford, G. N. **Two improved instruments for use in the O'Connor cinch shortening operation for heterotropia and heterophoria.** Trans. Pacific Coast Oto-Ophth. Soc., 1933, 21st annual meeting, pp. 168-170.

Jameson, P. C. **The ligated suture.** Arch. of Ophth., 1934, v. 12, Sept., pp. 377-379.

This procedure offers an anchorage of the muscle that will not give or slip and is applicable to any muscle operation. The suture is placed in the muscle in the usual manner and tied by a surgical knot, ligating a bundle of fibers and leaving the ends of the suture free. A similar suture is placed in the stump and the corresponding ends of each suture are tied by surgical knots, making a quadruple knotting. The procedure is clearly illustrated by drawings.

J. Hewitt Judd.

Neuschüler, J. **Considerations on the pathogenesis of total bilateral ophthalmoplegia from rachianesthesia.** Riv. Oto-Neuro-Oft., 1934, v. 11, May-June, pp. 255-273.

About five days after stovaine rachianesthesia a man of forty-eight years became affected with ptosis and almost complete immobility of both eyes. A month later paralysis of the sixth nerve was still present. From the clinical findings and experimental researches the author infers that the cause of rachianesthetic or rachicentesic complications is either a toxic action of the anesthetic, an aseptic meningeal reaction, intracranial hypertension or hypotension, constitutional predisposition, or an organic lesion. (Bibliography.)

M. Lombardo.

Nordmann, J. **Disturbances of ocular motility in Gaucher's disease of the newborn.** Boll. d'Ocul., 1934, v. 13, Jan., pp. 1-8.

A seven-months-old girl with the general symptoms of Gaucher's disease showed first alternating internal strabismus and then bilateral constant convergence until death three months later. Another girl three months old, the fifth among seven children to be affected by the disease, showed both eyes moving continuously and slowly from one to another direction. These oculomotor disturbances result from the progressive cortical atrophy and are a frequent sign of Gaucher's disease. (Five figures.)

M. Lombardo.

Ohm, J. **Optokinetic nystagmus in "septojod" injury to the retina.** Zeit. f. Augenh., 1934, v. 83, July, p. 338. (See Section 16, Injuries.)

Rebucci, E. **Treatment of strabismus by glasses in infancy.** Boll. d'Ocul., 1934, v. 13, March, pp. 349-373.

Among 120 cases of varieties of concomitant strabismus, 33 were found

suitable for correction by glasses. Of these, two remained unchanged, the others being either cured or improved. The writer states that strabismus from any form of ametropia can be cured in the greatest number of children if treatment is started between the ages of six and ten years, if the ametropia is fully corrected in each eye, and if the glasses are worn constantly. (Bibliography.)

M. Lombardo.

Rodin, F. H., and Newell, R. R. **Movements of eyes under cover. A roentgenographic study.** Arch. of Ophth., 1934, v. 12, Oct., pp. 525-535.

The authors describe a method in which metallic markers are placed in the conjunctiva near the limbus and at the external canthus, permitting roentgenographic study of the movements of the eyeballs under cover. They found that no change in the movements took place when one eye was covered with a pad. Bandaging one eye caused frank convergence in the primary position and some convergence in other positions. Padding both eyes caused convergence in the primary position but little effect otherwise. Bandaging both eyes caused definite convergence and definite limitation of movement in the horizontal directions. Incidentally it was found that the interpupillary distance varied from that of the primary position when looking to right or left. (Illustration, tables.)

J. Hewitt Judd.

Van Bogaert, Ludo. **Ocular paroxysms and palilalia.** Jour. Nerv. and Mental Dis., 1934, v. 80, July, p. 48.

The author reports three cases of Parkinsonian syndrome in which speech difficulties occurred in connection with ocular paroxysms. Fixed staring in an upward direction is accompanied by reiteration of short phrases or sentences. These phenomena are explained as being due to excessive inhibition.

Edna M. Reynolds.

5. CONJUNCTIVA

Biantovskaia, E., and Shapiro, E. **The diagnostic significance of cytologic study of follicles in adenoid tissue.** Sovietskii Viestnik Ophth., 1934, v. 4, pt. 6, p. 596.

The author studied the cellular reaction in follicles of adenoid tissue from various parts of the body, such as the conjunctiva, lacrimal sac, intestine, appendix, nasal turbinates, and tonsils. They found that the cellular reaction in adenoid tissue anywhere in the body did not differ from that found in the trachoma follicle. The number of lymphoblasts in the follicle, whether of trachoma or of folliculosis, depended on the type of follicle. The large soft follicle on the surface of the conjunctiva was richer in lymphoblasts than was the small, hard, imbedded follicle. Thus trachoma does not present a specific cellular picture.

Ray K. Daily.

Cattaneo, D. **Action of x-rays in the hyperplastic form of trachoma.** Rassegna Ital. d'Ottal., 1934, v. 3, Sept.-Oct., p. 661.

The author reports in detail the results of treatment of ten cases of trachomatous hyperplasia of the conjunctiva with radiotherapy. Several cases were completely cured, several improved, and the remainder were unaffected by the treatment. Conjunctival tissue was removed at various intervals during the treatment and was studied microscopically. The cellular changes which occurred are carefully described, and in general represent degenerative phenomena of the cellular elements of the hyperplasia. (Seven illustrations.)

Eugene M. Blake.

De Masi, A. **Old and new views on the etiology and treatment of trachoma.** Lettura Oft., 1934, v. 11, Oct., p. 495.

In the main, the author favors the newer treatment of Ruata which consists of a polyvalent vaccine or emulsion of bacteria containing 500,000,000 bacteria per c.c. Its administration was followed in a few days by disappearance of the subjective symptoms and improvement in the ulcerative process.

F. M. Crage.

Dodero and Cornet. **Eighteen cases of periocular degeneration in Indo-**

China. Ann. d'Ocul., 1934, v. 171, Sept., pp. 741-755.

This condition, which the author always speaks of as a tissue metamorphosis, presents four pathologic phases: (1) leucocyte infiltration, (2) hyaline degeneration, (3) amyloid degeneration, and (4) calcification or ossification. There are three clinical types: (1) palpebral conjunctival degeneration, (2) tarsal degeneration, and (3) submucous conjunctival degeneration. Added to these are mixed types. Trachoma appears to be the chief etiologic agent.

H. Rommel Hildreth.

Galante, E. **Biomicroscopic study of the limbus in trachoma.** Rev. Internat. du Trachome, 1934, v. 11, July, p. 129.

Galante describes in detail the appearance of the normal limbus as viewed with the corneal microscope and slitlamp. He then discusses the characteristic changes which occur in early pannus of trachoma, notably elongation of the capillary end loops and perivascular edema and infiltration. He traces the modifications which precede the appearance of fibrous tissue. The ocelli of Bonnet and the marginal facets of Herbert, he states, are not constantly present in the trachomatous eye.

Phillips Thygeson.

Galeazzi, C. **Parinaud's conjunctivitis from Pfeiffer's bacillus pseudotuberculosis rodentium.** Boll. d'Ocul., 1934, v. 12, Jan., pp. 64-110.

A girl of thirteen years lived in a room above a butcher shop, where cattle and poultry were slaughtered, their intestines being washed in the same fountain as the family linen. She developed the characteristic symptoms of Parinaud's conjunctivitis. From an excised conjunctival vegetation the author isolated the "bacillus pseudotuberculosis rodentium Pfeiffer." (Bibliography and ten figures.)

M. Lombardo.

Gallenga, R. **Corneo-conjunctival reaction at high altitude. Biomicroscopic and experimental study.** Rassegna Ital. d'Ottal., 1934, v. 3, Sept.-Oct., p. 806.

Gallenga studied twelve rabbits exposed to wind, snow, and cold at 3,000 meters above sea level. An abacterial conjunctivitis and superficial marginal keratitis followed after twenty-four hours. Cold without wind induced conjunctival hyperemia and turbidity of the corneal epithelium. It was possible in rabbits to reproduce the slitlamp picture of actinic keratitis by exposure to strong light reflected from the snow. Warm wet compresses rapidly restored the eyes to normal.

Eugene M. Blake.

Gifford, S. R., and Dillon, E. E. **The conjunctivoglandular syndrome of Parinaud. Report of a case showing a thread mold in sections.** Arch. of Ophth., 1934, v. 12, Oct., pp. 518-524.

A boy aged eleven years presented a typical Parinaud's conjunctivitis. A piece of tissue was removed and was examined microscopically. Staining by Verhoeff's modified Gram method revealed gram-positive elements. Some were small granules connected by delicate threads. In one section a mass of threads with a definite radial arrangement was seen. It is pointed out that the organisms become invisible unless decolorization is stopped at exactly the right stage. (Photomicrographs.)

J. Hewitt Judd.

Grinbarg, A. G., and Blidstein-Nevorochkina, N. J. **The action of ultraviolet rays on the follicular affection of the palpebral conjunctiva of dogs.** Arch. d'Opht., 1934, v. 51, Sept., p. 602.

Dogs suffering from follicular conjunctivitis, particularly of the third eyelid, were treated by ultraviolet radiation. The third eyelid of one eye was excised before treatment and that of the other eye after treatment, so that both could be examined histologically. Criticism might be offered as to the time element entering into the cure, as it would have been better to excise the untreated eyelid simultaneously with the treated one. It is concluded that ultraviolet rays in small dosage exercised a curative effect upon follicular conjunctivitis in these dogs without damaging the cornea; acting not only in a direct

manner, but also beneficially upon the entire general state of the animal.

M. F. Weymann.

Hetler, R. A., and James, W. M. **The influence of dietary deficiency on the transmissibility of trachoma to monkeys.** Amer. Jour. Ophth., 1934, v. 17, Nov., pp. 1048-1054.

Julianelle, L. A., and Harrison, R. W. **Studies on the infectivity of trachoma. 1. The transfer of a conjunctival infection to monkeys by means of trachomatous tissues.** Amer. Jour. Ophth., 1934, v. 17, Nov., pp. 1035-1044.

Kreibig, Wilhelm. **Conjunctival lesions in leukemia.** Zeit. f. Augenh., 1934, v. 84, Sept., p. 120.

In leukemia one observes fundus changes which may vary from slight dilatation of retinal vessels to severe retinitis. Only occasionally pallor of the vessels and yellow discoloration of the entire fundus suggest the etiology. Infiltrations of the orbit are also known. Unilateral or bilateral exophthalmos is seen and the differences of manifestation depend on the site of infiltration, which may be in the connective tissue of the lids, about or behind the eyeball, or in the lacrimal gland. The eye lesions of leukemic infiltration are less generally recognized. In the last two years Kreibig has observed five cases of leukemia in which the conjunctiva was the only eye tissue involved, or at least the first, the lesions seeming several times to be typical of leukemia.

The leukemic lesion of the conjunctiva is a thick, resistant whorl of tissue in the fornix, sharply circumscribed from the eyeball and the deeper orbital tissue and easily palpable through the lids. The bulbar conjunctiva may be similarly involved and may be so thick as to form a wall about the limbus. Involvement of the cornea and of the tear sac was observed once and must be very rare. The lesion must be differentiated from plasmoma and from amyloidosis.

F. Herbert Haessler.

Lewis, F. P. **Report of trachoma investigation.** Trans. Amer. Acad. Ophth. and Otolaryng., 1933, 38th annual meeting, p. 148.

The effect of insanitary living conditions upon the perpetuation and spread of trachoma is emphasized.

George H. Stine.

Marchesini, E. **Some researches on hematic biochemistry in trachomatous patients.** Boll. d'Ocul., 1934, v. 13, Jan., pp. 131-155.

The blood taken from forty patients affected by trachoma of different forms and stages, who had taken no food since the night before, was rendered not coagulable by the addition of a five percent solution of sodium citrate. It showed a prevalence of potassium over calcium content with marked alkalosis, so that vagotonic trachomatous cases predominate over the sympathicotonic, as demonstrated also by the low value of glycemia. The hypercholesterinemia shows the defensive function that lipoids have for acute and chronic inflammatory processes. No relation was found between trachoma and syphilis and the velocity of sedimentation. (Bibliography.) M. Lombardo.

Motolese, A. **"Initial epithelioma" of the limbus.** Boll. d'Ocul., 1934, v. 14, Feb., pp. 192-200.

A young man several members of whose family had been affected by carcinoma, and who had treated himself some time before for epithelioma of the lower lip, showed a neoformation which started at the upper limbus of the right eye and covered about one-half of the cornea. The histologic examination showed a "Poleff's initial epithelioma." (Bibliography and four figures.)

M. Lombardo.

Padovani, S. **Antitrachomatous therapy with intramuscular injections of colloidal copper.** Lettura Oft., 1934, v. 11, June, p. 263.

Gluteal intramuscular injections of colloidal copper were used as the author's therapy in trachoma. Doses of 5 c.c. were administered daily in some, but usually the injections were made on alternate days. In only a few were smal-

ler doses given. The best results were obtained in cases with corneal complications. Pannus and corneal ulcers showed a prompt and constantly beneficial response, in some cases as early as the third injection. It is the author's opinion that the medicament is activated by the specific action of the copper. F. M. Crage.

Padovani, S. **Endocrine imbalance in a patient with vernal catarrh and keratoconus.** Lettura Oft., 1934, v. 11, Sept., p. 442.

A male of twenty-two years manifested an active vernal catarrh and keratoconus in one eye. A few months later the other eye also showed keratoconus. Associated with the ocular disease were symptoms of endocrine imbalance including those of vagotonia and insufficiency of the hypophysis, thyroid, and suprarenal glands. The author maintains that the ocular manifestations in question can be regarded as alterations produced by the endocrine imbalance frequently met with in this period of life. F. M. Crage.

Panico, E. **Present knowledge on biomicroscopic study of the conjunctiva.** Boll. d'Ocul., 1934, v. 13, March, pp. 326-331.

The author will soon publish about one hundred colored drawings, grouped in twenty-one tables, of different normal and pathologic conditions of the conjunctiva as seen with the slitlamp. Of these he gives a description.

M. Lombardo.

Papoloczy, F. **Notes on syphilitic disease of the conjunctiva.** Arch. f. Augenh., 1933, v. 108, Dec., p. 334.

The author reviews a case of syphilitic disease of the conjunctiva published in 1930, and adds two more. He presents the various forms in which this disease appears. One type is a brawny, thickened reddening of the bulbar conjunctiva, to which the inflammation is restricted. A second is restricted to the the transitional folds, especially the lower, and the tarsal conjunctiva. These changes are usually monocular. A histological report is given on tissue excised in a case with round-cell infiltration, new-vessel formation, and new-formed connective tissue. Diagnosis is by Wassermann reaction and therapeutic test.

Dohrmann K. Pischel.

Thygeson, P. **The nature of the elementary and initial bodies of trachoma.** Arch. of Ophth., 1934, v. 12, Sept., pp. 307-318.

This report is based on the study of inclusion and free bodies in three cases of subacute trachoma, eight cases of trachoma with superimposed infection, and twenty-five cases of chronic trachoma. The morphology and staining reactions indicate a virus similar to those of inclusion blennorrhea and psittacosis. The virus apparently multiplies only in conjunctival epithelial cells. The elementary and initial bodies are stages in the life cycle of a virus which may be the etiologic agent of the disease. The bodies are quite numerous in subacute stages but often difficult to find in the chronic stages. The inclusions are intracellular colonies of the virus in various stages of development and not phagocytosed conjunctival bacteria. The small inclusion, composed of initial bodies, is the early phase, while the large inclusion, made up of elementary bodies, is the late phase of the virus. Bacteriologically sterile filtrates containing elementary bodies were obtained from highly concentrated suspensions by the use of collodion membranes having small infiltration areas, thus overcoming the adsorptive action exerted by the other filters. (Photomicrographs and bibliography.)

J. Hewitt Judd.

6. CORNEA AND SCLERA

Aliquò-Mazzei, A. **Clinical-anatomic-pathologic contribution to the study of ribbon opacity of the cornea.** Boll. d'Ocul., 1934, v. 13, Feb., pp. 201-228.

A man of fifty-four years showed a horizontal opacity in the center of the cornea of the right eye, a little elevated and of xerotic aspect, while the upper and lower sections of the cornea showed superficial vascularization. The

whole cornea was anesthetic. From histologic and histochemical examination of a fragment of the cornea the author excluded the presence of calcareous deposits. As cause of the opacity he assumes sensory and trophic disturbance. (Bibliography.)

M. Lombardo.

Chichkanova, A. **Regeneration of the corneal nerves after cataract extraction.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 6, p. 537.

This is a study and schematic report of sixteen postoperative cases, and of experimental work on rabbits. To test tactile sensibility a thread with 1 gm. of pressure per square mm. of surface was applied to the cornea, and for pain a thread with a pressure of 10 gm. per square mm. Corneal sections were made in rabbits' eyes, testing them for return of sensitivity, and making histologic studies of the cornea at varying periods after the sections. Regeneration of the cut nerves did not begin until two months after the operation. Complete regeneration took widely varying periods of time, and might never be complete. Loss of sensitivity in the lower portion of the cornea is explained by degenerative processes in isolated nerves, caused either by anastomosis of the nerves or by injury with an instrument. (Photomicrograph.)

Ray K. Daily.

Clerici, A. **Treatment of hypopyon keratitis by Rubbrecht's method.** Rassegna Ital. d'Ottal., 1934, v. 3, Sept.-Oct., p. 683.

Rubbrecht treated hypopyon keratitis by early incision of the cornea and covering the opening with a conjunctival flap. Clerici applied this method in five cases and praises it highly. Two of the cases healed favorably. The third case was seen late and the whole cornea ulcerated and finally perforated spontaneously. The fourth was complicated by suppurative dacryocystitis and was lost. In the fifth case the flap became loosened but the final result was fairly good. Eugene M. Blake.

Focosi, M. **A case of episcleritis from aspergillus fumigatus complicated by deep keratitis.** Boll. d'Ocul., 1934, v. 13, Feb., pp. 177-192.

A man of twenty-eight years, five months after an operation for pterygium, showed three small whitish-yellow nodules covered by conjunctiva at the place of the previous scar. A deep keratitis developed which recovered some time later. Cultures from the contents of the nodules showed aspergillus fumigatus, which injected under the conjunctiva of rabbits gave rise to slow inflammation with formation of a nodule, but if injected in the cornea provoked a violent reaction, and if injected in the vitreous produced panophthalmitis. (Bibliography, six figures.)

M. Lombardo.

Friede, Reinhard. **Variations in shape of the adult human cornea.** Arch. f. Augenh., 1933, v. 108, Dec., p. 249. (See Amer. Jour. Ophth., 1934, v. 17, Jan., p. 79 (2 refs.), March, 268, and May p. 452.

This paper is an example of the practice somewhat too common, of publishing practically the same material in a number of different journals.

Galante, E. **Action of anterior and posterior epithelial layers of the cornea on autolysis of the substantia propria.** Boll. d'Ocul., 1934, v. 12, Feb., pp. 261-266.

The corneal stroma of dogs, just killed, was kept for eight days in a tube containing physiologic salt solution with sodium fluoride at 38° centigrade. The writer could demonstrate that the anterior and posterior layers of the cornea had an antagonistic influence in the metabolic activity of the corneal parenchyma. This action was weakened by absence of the epithelium and its basal membrane, and was increased by absence of the endothelium and the posterior basal membrane. Absence of all four layers had no influence on the metabolic activity of the stroma. (Bibliography.) M. Lombardo.

Gallenga, R. **Cornep-conjunctival reaction at high altitude. Biomicroscopic**

and experimental study. Rassegna Ital. d'Ottal., 1934, v. 3, Sept.-Oct., p. 806. (See Section 5, Conjunctiva.)

Goldfeder, A. E., and Solowjowa, M. K. **Our experiences with the nonsurgical treatment of anterior staphyloma according to the method of Jamada-Kayanagi.** Zeit. f. Augenh., 1934, v. 84, Oct., p. 233.

The authors describe a simple procedure for the treatment of staphyloma. After instillation of cocaine, they tattoo the leukoma, and then introduce a stout needle attached to a syringe into the vitreous chamber. If the staphyloma is small, 2 c.c. of fluid vitreous is removed; for a very large one, up to 5 c.c. A quantity of ten percent salt solution equal to one-half the volume of vitreous removed is then injected. If no vitreous can be removed, one must suspect intraocular neoplasm. In most cases, the salt solution induces shrinkage of the eyeball and a very satisfactory result.

F. Herbert Haessler.

Hofe, K. **Concerning so-called passive anaphylaxis of the cornea.** Arch. f. Augenh., 1933, v. 108, Dec., p. 246.

No reaction was shown by the cornea of rabbits into which was injected serum from another rabbit previously treated with intravenous injection of 5 c.c. of horse serum. Rabbits whose corneae had been thus treated showed no local reaction when three days later they received horse serum intravenously. A mixture of antigen (horse serum) and rabbit serum (from a rabbit previously treated intravenously as above described) caused, when injected into the corneae of rabbits, a marked reaction the next day in the majority of cases; with a second reaction six days later (much sooner than in the control eye). Dohrmann K. Pischel.

Malinin, I., Sharkovski, I. **The clinical history and pathologic anatomy of parenchymatous keratitis.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 6. p. 605.

A girl of twelve years presented herself with a history of traumatism in the right eye, and a severe bilateral inflammatory condition with greatly reduced vision. The diagnosis was sympathetic ophthalmia and the right eye was enucleated. A serologic test subsequent to enucleation, with the histopathology of the enucleated eye, established the diagnosis of luetic parenchymatous keratitis. Because the literature contains only twelve histopathologic reports of parenchymatous keratitis, the histopathology of this eye is reported in detail. (Photomicrographs.)

Ray K. Daily.

Ochapovski, C., and Lipovski, A. **Pathology of the cornea; herpetic keratitis.** Sovietskii Viestnik Opht., 1934. v. 5, pt. 2, p. 109.

Herpetic keratitis is frequent in Kuban, where the author saw 749 cases during the last twenty years. Of these sixty percent occurred in the warm months of the year, and seventy-two percent were in men. This the author attributes to the greater incidence of malaria in men and in the summer months, malaria being the etiologic factor in ninety percent of the cases. Herpetic keratitis, vesicular keratitis, and dendritic keratitis represent the same histopathologic process, differing only in extent and severity and the presence of complications. The erosion which comes next may assume various forms. The author attributes the disease to malarial trophic neuritis of the corneal nerves. Ray K. Daily.

Padovani, S. **Endocrine imbalance in a patient with vernal catarrh and keratoconus.** Lettura Oft., 1934, v. 11, Sept., p. 442. (See Section 5, Conjunctiva.)

Shapiro, E. **Corneal sensitivity to touch in malaria.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 2, p. 129.

Of eight cases of keratitis due to malaria seven were unilateral. The reduced corneal sensitivity was marked not only in the involved area, but also in the clear healthy portion of the cornea. The corneal sensitivity of the uninvolved eye was also reduced. From this it seemed that the corneal nerve endings were affected by malaria and that the corneal insensitivity was not the result

of the keratitis, but was probably a predisposing factor. To throw further light on the situation the author tested the corneal sensitivity of twenty malaria patients without ocular involvement. In five the corneal sensitivity was greatly reduced, in four moderately, and in nine cases slightly. Ray K. Daily.

Vele, M. **Biomicroscopic aspects of trachomatous pannus.** Boll. d'Ocul., 1933, v. 12, Dec., pp. 1458-1469.

The writer examined at the slitlamp one hundred and fifty patients of different ages and at various stages of the disease. She describes the biomicroscopic aspects of the different lesions and states that pannus is a constant finding even in the lower quadrant of the cornea. The disease is a subchronic process that may have an acute stage. (Bibliography.) M. Lombardo.

Villani, G. **A particular degenerative lesion of the cornea in three atypical cases of amaurotic family idiocy.** Boll. d'Ocul., 1933, v. 12, Nov., pp. 1328-1338.

Three brothers of nine, seven, and one and a half years respectively showed typical ocular and general symptoms of amaurotic family idiocy with the exception of its protracted course; and had a new degenerative corneal symptom not yet reported in the literature. At the slitlamp a dustlike superficial infiltration was seen, with very fine dots all over the cornea except 1 mm. of clear tissue at the periphery. There was no sign of vascularization. The writer thinks the corneal lesion probably due to degeneration in the nervous elements of the cornea. (Bibliography, three figures.)

M. Lombardo.

Walker, C. E., Jr. **Malnutrition in relation to ulceration of the cornea in gonorrheal ophthalmia neonatorum.** Amer. Jour. Ophth., 1934, v. 17, Dec., pp. 1146-1147.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Barr, A. S. **Essential (progressive) atrophy of the iris. Report of a case.** Arch. of Ophth., 1934, v. 12, Oct., pp. 567-570.

A woman of forty-nine years presented typical findings over a period of six years. The progress of the atrophy is shown by three sketches. Attacks of dull pain and slight congestion of the eye may have been transient attacks of glaucoma, but at no time was increased tension found. The etiology is unknown and treatment is unsatisfactory.

J. Hewitt Judd.

Cepero, G., and Comas, L. **Diathermy in the treatment of iritis.** Zeit. f. Augenh., 1934, v. 84, Oct., p. 211.

The authors, who have described the details of their technique elsewhere, believe that diathermy is a most useful method of treatment of ocular lesions. Of diseases in which this treatment was most successful, iritis of all kinds stands first, with interstitial keratitis, corneal ulcer, and optic neuritis. The authors ascribe the effect of the treatment to disturbances in intraprotoplasmic structure by the high frequency waves, and not to the heat which is engendered.

F. Herbert Haessler.

Guillery, H. **An unusual histologic picture in the eye of a leprous patient, together with notes on racial characteristics in the eye.** Arch. f. Augenh., 1933, v. 108, Dec., p. 226.

Massive accumulations of lymphocytes occupied the outer portions of the choroid, extending in to the suprachoroidal space. Internally the spread of the lymphocytes was stopped by an abnormally dense "Sattler membrane" so that the choriocapillaris was almost entirely free. This membrane was apparently very resistant, because it could be traced, pushed into the choriocapillaris by pressure of the lymphocytes from behind. In a few places it had been broken through.

The racial peculiarity of heavy iris pigment, with almost wart-like excrescences on the anterior surface, has been mentioned by several writers. In this eye, which was perforated, these conical pigment excrescences were so firm that they had irregularly dented the posterior corneal surface. Pigment

was also noted in the peripheral corneal epithelial cells.

Dohrmann K. Pischel.

Mossa, G. **Freely movable cyst in anterior chamber.** Lettura Oft., 1934, v. 11, June, p. 257.

A freely movable cyst 2 by 3 mm. with posterior corneal deposits and accompanying irritative symptoms, was found in the anterior chamber of a male aged sixty-three years. There was also incipient clouding of the lens, with diminution in vision. The eye was normal up to two days before onset of the symptoms, which followed a fist blow on the eye. The author believes that the trauma caused detachment of the preexistent cyst from the posterior surface of the iris or ciliary body, whence it passed through the pupil into the anterior chamber. F. M. Crage.

Sala, G. **Pathologic adiposis of the eyeball.** Boll. d'Ocul., 1934, v. 13, March, pp. 385-396.

The right, blind eye of a man of sixty-eight years showed a hyphema-like deposit in the anterior chamber, and an atrophic iris whose pupil was occluded by exudate. Sections of the eye showed in different structures of the eye a variety of fatty substances such as are usually present in xanthomatosis bulbi. The author is of opinion that in such condition the fatty substances found in the anterior chamber and between the choroid and the detached retina represent an excess of fatty substances infiltrating the uveal tract which has been the seat of chronic inflammation. (Bibliography, two figures.)

M. Lombardo.

Selinger, Elias. **Studies in the protein content of the human aqueous (therapeutic measures; and significance in papilledema and papillitis).** Amer. Jour. Ophth., 1934, v. 17, Dec., pp. 1130-1137.

8. GLAUCOMA AND OCULAR TENSION

Archangelskii, B. **Pathology of glaucoma.** Sovietskii Viestnik Opht., 934, v. 4, pt. 6, p. 561.

From microscopic study of fifty enucleated eyes the author sees the development of glaucoma as follows: The cause of the first disturbance in the daily curve of intraocular tension is to be sought in the vascular system of the eyeball, especially in the choroidal capillaries, and in the nerve systems controlling ocular circulation. The early change is a transitory atony of the choroidal blood vessels. This border-line change may proceed to recovery or to acute glaucoma. Persistent vascular atony leads to congestion and thickening of the choroid, and to compression of the vitreous and its displacement forward, as manifested in a shallow anterior chamber. When capillary permeability is permanently changed, lowering the intraocular tension cannot check the process. (Photomicrographs.)

Ray K. Daily.

Churgina, E. **Results of the Elliot operation, relative to central vision and changes in the anterior segment of the eye.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 6, p. 553.

Out of 254 operations the immediate effect was normal tension in 92.9 percent. Of cases reexamined from one to ten years later, 80 percent showed normal tension. In spite of this apparently good result relative to tension, deterioration of central vision was found. In 18 percent of the cases the immediate effect was lowered central vision. From three to ten years after operation vision was impaired in 61 percent of the cases. Most postoperative cases had dispersion of pigment through the iris, anterior synechiae, and deposit of pigment on the capsule of the lens. Ray K. Daily.

Cohen, M., Newell, J. M., and Killian, J. A. **Experimental studies on swelling of the vitreous gel and on intraocular pressure.** Arch. of Ophth., 1934, v. 12, Sept., pp. 352-358.

Experiments were conducted with ox vitreous to measure its swelling power against the force of gravity and to determine the proportions of the free liquid and the liquid bound by the colloidal solids of the gel. Alkaline solutions, acids, and various salts had no

demonstrable effect on the bound or free fluid of the vitreous. The feeding of a low protein diet to rats caused a decrease of the blood-plasma proteins but did not produce increased intraocular pressure. Results of experiments with pressure ultrafiltration through cellophane indicate that the vitreous gel is composed of a meshwork of elastic fibrillae suspended in a viscous liquid. Hence, true swelling of the vitreous is impossible and the intraocular pressure is entirely due to fluid pressure as determined by hydrostatic and osmotic forces. (Tables.) J. Hewitt Judd.

Cordero, C. and Porta, C. F. **Contribution to the study of the relation between glaucoma and hypacusia.** Arch. di Ottal., 1934, v. 41, April-May, p. 159.

Thirty-nine cases of primary glaucoma and five cases of secondary glaucoma were carefully studied by the author, and in all cases the ear findings and percentage of loss of hearing were tabulated. In primary glaucoma 30 to 75 percent showed diminution in hearing for high tones, and in five cases there was also diminution for low tones, due to middle ear disease. In the secondary glaucoma cases there was no defective hearing. The author is of opinion that the clinical and symptomatic relation between glaucoma and hypacusia is best explained by vascular degenerative lesions. H. D. Scarney.

Gouterman, J. I. **Early recognition of simple noninflammatory glaucoma.** Arch. of Ophth., 1934, v. 12, Sept., pp. 407-418.

The author reviews the early signs and symptoms of glaucoma, especially stressing the ophthalmoscopic features, visual and field changes, disturbances in the light sense, the special tests with drugs, massage, and the gonioscope, and the signs of Thiel and Koeppe detected by means of the slitlamp. He urges all to become glaucoma-minded so that earlier diagnosis and hence greater preservation of vision may result. J. Hewitt Judd.

Mossa, G. **Influence of lacrimal gland extract on intraocular tension.** Lettura Oft., 1934, v. 11, June, p. 275.

Intravenous injections of a solution of dry extract of the lacrimal gland of the ox, administered to the guinea pig, caused elevation of intraocular tension. This pressor substance in the gland extract is nonproteid, soluble in alcohol, and thermolabile. Another substance found in the extract lowered tension, but its power was less than that of the pressor substance. The Schiötz tonometer was used in taking the tension. F. M. Crage.

Rossi, G. **The parathyroids and ocular tension.** Arch. di Ottal., 1934, v. 41, April-May, p. 195.

Complete ablation of the parathyroid glands was made possible in the dog by removal of a portion of the thyroid gland. In eight dogs there was a diminution in ocular tension (Schiötz tonometer) following removal of the parathyroids. Greater decrease of tension occurred in dogs suffering with profound cachexia after the parathyroidectomy. H. D. Scarney.

Row, H. **Operation to control glaucoma. Preliminary report.** Arch. of Ophth., 1934, v. 12, Sept., pp. 325-329.

The procedure consists of the insertion of a horse hair, which is doubled on itself with the loop leading, along a grooved spatula through the channel produced by the usual cyclodialysis until the loop is in the anterior chamber just anterior to the root of the iris. The two ends extend out two millimeters from the sclera and are covered with Tenon's capsule and conjunctiva. The author has used this in three eyes (two cases) with little reaction and favorable results on tension. He recommends it for cases of primary bilateral absolute glaucoma. J. Hewitt Judd.

Velhagen, K., Jr. **The associated pupillo-motor effect of some modern anesthetics.** Arch. f. Augenh., 1933, v. 108, Dec., p. 308.

The author tried the effect of pantocain, larocain, diocain, psicain, and holocain on isolated specimens of the iris dilator muscle of the rabbit. No effect was noted in concentrations as high as 1 to 4000. Concentrations of 1

to 400 seemed to cause the muscle to lose tone so that it would no longer react to adrenalin 1 to 4,000,000. Similar experiments were performed on isolated muscle preparations of the sphincter iridis of cows. Here the test solution was a 1 to 400,000,000 solution of carbaminoylcholin. The anesthetic solutions showed no action in dilutions below 1 to 4,000, but dilutions of 1 to 4,000 caused slight but regular relaxation. The author concludes that the anesthetics tested will clinically have no effect on the pupil, though in glaucomatous eyes one could follow their use with a miotic.

Dohrmann K. Pischel.

Wright, R. E. **Remarks on treatment of primary glaucoma.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 336.

The author summarizes the preoperative and operative care of glaucoma which he found most successful in his large clinical service in India. He offers the following classification: chronic primary noncongestive glaucoma, glaucoma simplex, acute congestive primary glaucoma, glaucoma with aphakia, secondary glaucoma due to intumescent cataract, and secondary glaucoma with iris bombé.

Beulah Cushman.

9. CRYSTALLINE LENS

Bailey, J. H. **An improved cystotome.** Arch of Ophth., 1934, v. 12, Oct., pp. 580-582.

This instrument has a two-edged broad blade, the proximal edge being 2 mm. long and perpendicular to the shank. The handle is round to permit easy rotation. J. Hewitt Judd.

Balcet, C. **Weight, diameters, and volume of the lens in relation to age and weight of the animal.** Boll. d'Ocul., 1933, v. 12, Oct., pp. 1135-1145.

The author examined the lenses of forty-two horses and thirty oxen, and comes to the following conclusions. The lenses grow in the same proportion as the eyeball during early age, and both grow more rapidly than the body generally. The equatorial diameter lengthens during the period of development, while the anteroposterior diameter varies little in length. Heavier eyeballs with greater anteroposterior diameter contain bigger lenses. The specific weight of the lens is lower in early age and increases with age. The two eyeballs and lenses of the same animal differ slightly in weight and dimensions but their specific weight is the same. Lenses which have the same volume may have different diameters or weight. (Bibliography.)

M. Lombardo.

Burky, E. L. **Experimental endophthalmitis phacoanaphylactica in rabbits.** Arch. of Ophth., 1934, v. 12, Oct., pp. 536-546.

Experiments with rabbits show that hypersensitivity to lens substance can be produced by the intermediary action of staphylococcus toxin, and that when the lenses of the sensitized animals are needled endophthalmitis phacoanaphylactica results. Experiments omitting the staphylococcus toxins were negative. It is sugested that toxin from a focus of infection, or from actual infection of the eye by toxin-forming bacteria, results in lens sensitivity in man.

J. Hewitt Judd.

Campbell, D. A. **The chemical pathology of cataract.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 391.

The author reviews the work that has been done on the chemistry of the lens, and concludes that, while the study of chemical pathology is still in its infancy, the causes of senile and other forms of cataract will be found.

Beulah Cushman.

Cooper, J. B. **The pathology of cataract.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 401.

The author reviews his experimental work on the development of cataract. Spectroscopic determination of the potassium and calcium ratio in normal and cataractous lenses he feels to be most important. Potassium he thinks more important than calcium in relation to cataract. He concludes that the active poison is probably a reducing agent

and may be oxalic acid, or potassium or sodium oxalate, interfering with normal lens respiration.

Beulah Cushman.

Elschnig, Anton. **Lens extraction in myopia.** Amer. Jour. Ophth., 1934, v. 17, Dec., pp. 1118-1121.

Galante, E. **Biochemical modifications of the lens during provoked dynamic refraction.** Boll. d'Ocul., 1934, v. 13, March, pp. 374-384.

The author excited accommodation in dogs and rabbits by instillation into their conjunctival sacs of a solution of pilocarpin and eserin; and he relaxed it by instillation of atropin. He then determined the amidoacid contents of the lens extracted with its capsule as soon as the animal died. The amount of amidoacids increased during excitation and decreased during relaxation of the accommodation. Analogous results were obtained with researches in vitro. The results demonstrate that the capsule of the lens and its epithelium regulate the nutrition of the lens. (Bibliography.) M. Lombardo.

Lenhard, Oskar. **Concerning the double refraction of the lens.** Arch. f. Augenh., 1933, v. 108, Dec., p. 1.

The lenses of various animals were examined by means of polarized light, as to the arrangement of the fine structural details. The double refraction of the lens leads the author to deduce a radial arrangement of these elements (micellae). The double refraction of the chicken lens differs typically from that of the mammalian lens. The radial arrangement is regarded as developing in the embryo under the influence of capsule and tissue tension, some later peculiarities perhaps developing under the influence of accommodation.

Dohrmann K. Pischel.

Margenat, J. **Modern surgery of cataract: phacoerisis.** Rev. de Ophth. de São Paulo, 1934, v. 3, July, pp. 307-324.

This eighteen-page article describes in detail, in the Portuguese language, the Barraquer operation for intracapsular extraction. (Nineteen illustrations.) W. H. Crisp.

Monjukowa, N., and Fradkin, M. **New experimental data on the pathogenesis of cataract.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 2, p. 97.

Recent investigations have demonstrated the abundance of scorbutic acid, chemically identical with vitamin C, in the eyeball. A marked fall in the content of vitamin C in the aqueous humor of eyes with lenticular opacities has also been demonstrated. The authors undertook to determine whether absence of vitamin C was an etiologic factor in cataract or merely an accompanying phenomenon. Of twenty-five guinea pigs put on a diet to produce scurvy, six developed incipient cataract late in the disease. With the slitlamp the opacity was seen to consist of superimposed ringlike opacities chiefly in the posterior cortex and nucleus. In eleven guinea pigs suffering from scurvy, but still with clear lenses, the anterior chambers were emptied without injury to the lens. In a day or two all these animals developed incipient cataract. Similar anterior chamber punctures were made in three guinea pigs which had been put back on a normal diet for some time, and on six healthy animals; and none of these developed cataract. Restoration of normal diet arrested the development of the cataract in most cases. These experiments suggest the etiologic rôle of vitamin C in cataract and its importance in the metabolism of the lens. Lack of vitamin C does not affect the lens immediately, because for a time it utilizes the reserve of this vitamin in the anterior chamber.

Ray K. Daily.

Motolese, A. **Surgical treatment of high myopia.** Boll. d'Ocul., 1933, v. 12, Nov., pp. 1173-1297. (See Section 3, Physiologic optics, refraction, and color vision.)

Wright, R. E. **Some impressions derived from experience in cataract extraction.** Indian Med. Gazette, 1934, v. 49, Nov., pp. 636-640. (See Amer. Jour. Ophth., 1934, v. 17, July, p. 661.)

10. RETINA AND VITREOUS

Bellora, A. **Considerations on a case of embolism of the central artery of the retina, with extrapapillary arterial anastomoses.** Boll. d'Ocul., 1933, v. 12, Oct., pp. 1075-1097.

A woman of thirty-five years, affected by organic heart disease, became suddenly blind in the left eye a few days before her menstrual period. A few days later some vision came back. Ophthalmoscopic examination showed, beside the usual evidence of embolism of the central artery, an oval spot of normal color measuring two disc diameters, between the disc and the macula. A branch of the superior temporal artery ran above the upper border of the spot, and parallel to that was a papillomacular artery coming from the central artery. These vessels anastomosed. By this collateral circle the patient got vision of 5/200, with a very much contracted visual field. (Bibliography, two figures.) M. Lombardo.

Bietti, G. **Researches on variations of temperature in some zones of the eyeball by episcleral diathermocoagulation, thermocauterization and cryocauterization.** Boll. d'Ocul., 1933, v. 12, Dec., pp. 1427-1457.

The author experimented on animals to determine whether recent operations for detachment of the retina are responsible for the formation of cataract. He concludes that thermocauterization and episcleral diathermocoagulation produce a slight rise of temperature at the center of the vitreous body, behind the lens, or in the anterior chamber, while cryocauterization lowers the temperature to some extent, but that these devices, as clinically used, cannot produce such changes in intraocular temperature as to cause a cataract. The late cataractous manifestations may be due to the presence of toxic substances derived from the cauterization, or to disturbed functions of the ciliary body. (Bibliography.) M. Lombardo.

Biozzi, G. **Angioid streaks of Knapp.** Boll. d'Ocul., 1933, v. 12, Nov., pp. 1303-1316.

The author gives the general history and a complete description of the ophthalmoscopic picture of angioid streaks of the retina in a mother of seventy-six, her son of forty-three, and a daughter of forty-six years. Histologic examination of their skin showed diffuse presenile and senile degeneration and not the characteristic degenerative foci of pseudoxanthoma elasticum. (Bibliography, three colored plates, two figures.)

M. Lombardo.

Brana, J., and Schiff, G. **Importance of the ophthalmoscopic picture in arteriosclerosis and essential hypertony.** Boll. d'Ocul., 1933, v. 12, Nov., pp. 1298-1302.

The cases are divided by the authors into three groups according to their fundus manifestations. The following conclusions are reached as far as the prognosis quoad vitam is concerned: If the blood pressure is high and ophthalmoscopy does not show the corresponding fundus changes the prognosis is good. If the blood pressure is not high but the ophthalmoscopic examination is positive the prognosis is bad. Cases of group three, showing optic atrophy, hemorrhages, and retinal degeneration, are predisposed to apoplexy.

M. Lombardo.

Brana, J., and Schiff, G. **Relationship between arteriosclerosis, essential hypertension, and the fundus.** Wien. med. Woch., 1934, Sept. 15, p. 1013.

Seven years of experience have shown the authors that the prognosis in arteriosclerosis and essential hypertension can only be determined with the aid of the ophthalmoscope (in addition to other methods of examination). Where marked sclerotic vessel changes are present with hemorrhage, or if optic atrophy from disturbed nutrition is present, or if there is retinal degeneration, fifty percent of these patients die within two years. The others have apoplectiform attacks from thrombosis, or hemiplegia.

Theodore M. Shapira.

Brav, Aaron. **Bilateral macular coloboma.** Amer. Jour. Ophth., 1934, v. 17, Dec., pp. 1151-1152.

Caramazza, F. **Adhesive chorioretinitis from diascleral and transcleral diathermocoagulation.** Boll. d'Ocul., 1933, v. 12, Dec., pp. 1357-1426.

From experiments on diascleral diathermocoagulation in seven rabbits and five dogs, and on transcleral coagulation in seven eyes of rabbits, observed ophthalmoscopically after the operation and histologically after enucleation of the eyes, the author comes to the following conclusions. By diathermocoagulation a type of adhesive chorioretinitis is obtained which can occlude the retinal tear, and satisfactory results were obtained also in cases of multiple tear in which the original Gonin technique was insufficient. The author is in favor of the diascleral method because its technique is easier, and does not provoke unpleasant complications either at the site of application or at a distance. (Bibliography, four colored plates.)

M. Lombardo.

Castroviejo, Ramon. **Experimental detachment of the retina.** Amer. Jour. Ophth., 1934, v. 17, Dec., pp. 1112-1117.

Chichkanova, A. **Regeneration of the corneal nerves after cataract extraction.** Sovietskii Viestnik Opht., 934, v. 4, pt. 6, p. 537. (See Section 6, Cornea and Sclera.)

Galeazzi, C. **Further observations on a case of retinitis circinata.** Boll. d'Ocul., 1933, v. 12, October., pp. 1108-1113.

In a case of retinitis circinata previously described, the pathologic process was not uniformly progressive, and the characteristic white spots were not the expression of hemorrhagic changes but appeared in special zones of retina preceded by changes of a probably degenerative nature, the spots always extending centripetally. (Two figures.)

M. Lombardo.

Hesky, M. **A case of severe retinitis proliferans due to the action of compressed air on both eyes after an explosion.** Boll. d'Ocul., 1934, v. 13, Jan., pp. 156-171.

A boy of three and one-half years, who had sustained the violent action of compressed air on the face, showed the interior of both eyes lined by a whitish substance and the posterior poles covered by a mass giving the appearance of pseudoglioma. The writer regards this as a case of traumatic chorioretinitis proliferans, with cicatricial involution of the internal membranes and production of connective tissue at the posterior poles probably due to intraocular hemorrhage. (Bibliography.) M. Lombardo.

Hesky, M. **Further clinical observations of bilateral and symmetric spherical formations in the vitreous.** Boll. d'Ocul., 1933, v. 12, Oct., pp. 1146-1163.

A man of fifty-two years affected with tabetic optic atrophy and a luetic woman of forty-four years with normal discs showed small foreign bodies floating in each vitreous and taking the same position after any movement of the eye. The writer regards them as persistent elements of the fetal vascular system. (Bibliography, color figures.)

M. Lombardo.

Junius, Paul. **Angiomatosis retinae—retinitis exudativa Coats—Osler's disease.** Zeit. f. Augenh., 1934, v. 84, Oct., p. 193.

Junius reviews the literature concerning diseases of which the manifestations include teleangiectases and capillary disturbances which may be associated with exudate and hemorrhage. The literatures of dermatology and internal medicine are included, and it is the author's purpose to stimulate more comprehensive studies of such ocular lesions. F. Herbert Haessler.

LaRocca, V. **Alterations of retina in experimental toxic nephrosis.** Arch. of Ophth., 1934, v. 12, Oct., pp. 509-517.

Typical subacute nephrosis and fatty degeneration of the liver were produced in rabbits by subcutaneous injections

of uranium acetate. Histologic examination of the eyes showed edema of the inner layers of the retina and of the fibers of the optic disc. In some parts the separation resulted in the formation of cystlike spaces. These changes are interpreted as representing an incipient or mild nephritic retinitis. In every case the severity of the retinal edema was proportional to the severity of the renal lesions. The association of a vascular poison, glyceryl trinitrate, or of epinephrine did not modify the changes produced by uranium acetate alone, (Photomicrographs.) J. Hewitt Judd.

Latte, M. **Historical remarks on retinal detachment.** Zeit. f. Augenh., 1934, v. 84, Oct., p. 217.

After outlining the history of the study and treatment of retinal detachment, the author emphasizes that Vogt's theory differs from all others in separating established facts from excogitated hypotheses. Etiological factors include heredity, senium, arterial and arteriolar sclerosis, vasoneuroses, endocrine and metabolic disturbances, intoxications, infections, entozoa, trauma, tumor, and malformation.

F. Herbert Haessler.

Law, F. W., and Greeves, R. A. **Diathermy in ophthalmology.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 474.

The first author takes up the medical use of diathermy in treatment of eye diseases. He states that there is even distribution of heat between the electrodes, and that raising the temperature is the only effect produced by the passage of a diathermy current. He found the current of value in all chronic inflammations of the eye, and of most value in the treatment of acute or chronic glaucoma, by reduction of tension as a preoperative measure. The treatments were from three to five minutes. The second author confines his remarks to use of the diathermy current in the operative treatment of detachment of the retina. He reports good results in forty-seven percent of the cases. Beulah Cushman.

Levkoeva, E. **Report of the histopathologic findings of an eye enucleated after Gonin's operation.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 6, p. 567.

Fifteen months after three unsuccessful Gonin operations, the irritable and somewhat atrophic eye was enucleated. The histologic sections showed changes in sclera, choroid, retina, and iris from which the author deduces that the heat of the galvanocautery was too intense. The subretinal fluid was rich in lipoids and cholesterin crystals. There were large hemorrhages within the retina, which the author attributes to the pull of a second detachment on the firmly reattached retina. One of the operations had been performed too close to the ciliary body and in a direction which led to injury of the lens. (Photomicrographs.) Ray K. Daily.

Mazzi, L. **Familial retinal macular degeneration associated with hemorrhage of the retina.** Arch. di Ottal., 1934, v. 41, April-May, p. 225.

Cases occurring in father and son are described in detail. Both patients showed central macular degeneration with absolute central scotomata and normal peripheral fields. The author concludes that vascular degeneration in the macular region is the cause of the blindness. (Color plate.)

H. D. Scarney.

Mossa, G. **Contribution to the study of retinitis proliferans.** Lettura Oft., 1934, v. 11, Aug., p. 404.

The author describes a case of retinitis proliferans in a female aged twenty-two years who had had malaria. The connective tissue was more extensively developed in the peripheral portions of the retina. Lues and tuberculosis were ruled out as possible causes, and the toxins of the malaria were considered to be the etiological basis.

F. M. Crage.

Pohoryles, G. **The action of acetylcholine upon the pressure in the retinal vessels.** Rassegna Ital. d'Ottal., 1934 v. 3, Sept.-Oct., p. 794.

Seven cases of optic nerve atrophy of various ages and both sexes were

treated by the author with acetylcholine, given either subcutaneously or into the orbit. Soon after the injection there was elevation of general and retinal arterial pressure. The increased pressure lasted only a few minutes and was followed by decrease. Systolic pressure was more affected than diastolic. Intraocular tension followed the same course as arterial pressure but was less marked, and rapid return to normal was the rule. (Six illustrations.)

Eugene M. Blake.

Poos, F. **The status of retinal detachment and its new methods of treatment.** Deut. med. Woch., 1934, Nov. 16, p. 1743.

Poos reviews the present operative treatments of retinal detachment, favoring the diathermy method of Weve-Larsson. He suggests that reports of cases should differentiate between anatomical and functional cures.

Theodore M. Shapira.

Post, M. H. **Diathermy in retinal detachment.** Amer. Jour. Ophth., 1934, v. 17, Dec., pp. 1122-1125.

Smoleroff, J. W., and Agatston, S. A. **Metastatic carcinoma of the retina.** Arch. of Ophth., 1934, v. 12, Sept., pp. 359-365.

The authors report the case of a man aged fifty-five years in whom metastasis occurred from a gastro-esophageal adenocarcinoma into the retina proper, not involving the optic nerve, its sheath, or any other portion of the globe. They found no similar case reported in the literature. Since tumor cells were found in the vessels of the lungs and liver, it is assumed that the retinal tumor originated from a very small tumor embolus which had lodged in one of the smaller arterioles in the nerve-fiber layer. (Photomicrographs.)

J. Hewitt Judd.

Struble, G. C. **Retinitis proliferans in diabetes.** Amer. Jour. Ophth., 1934, v. 17, Dec., pp. 1137-1140.

Vogt, A. **Catholysis as a new technique for operative closure of holes in the retina and for treatment of its detachment.** Brit. Jour. Ophth., 1934, v. 18, Nov., p. 650.

This is the method previously described in German (see American Journal of Ophthalmology, 1934, volume 7, page 1190.)

Wegner, W. **The blood pressure in the intraocular vessels.** Arch. f. Augenh. 1933, v. 108, Dec., p. 313.

Whereas previous writers have agreed that the pressure in the choroidal and retinal arteries is the same, the author is led to doubt this by a clinical observation. A forty-three-year-old woman showed bilateral glaucoma with poor vision and tension of 49 mm. Hg. After dilatation of the pupils with glaucosan, the fundus of each eye showed tremendous excavation, with marked arterial pulse, as well as marked pulsation of two of the short ciliary arteries just after their entrance through the sclera on each side of the disc. The pressure in the right eye fell only to 48 mm. Hg, with no change in the fundus. The pressure in the left eye fell gradually. As it reached 39 mm. Hg, the short ciliary arteries ceased pulsating, but the central artery continued to show a pulsation until the pressure dropped much lower, finally reaching 18 mm. Hg. Tests then made with the Bailliart dynamometer showed a retinal arterial pulse at a pressure of 35 to 37 mm., and a return of the ciliary arterial pulse at 48 to 50 mm. No pulsation of choroidal arteries elsewhere in the fundi was found. The physical findings of the patient's cardiovascular system were normal, blood pressure 135/85 mm. The diastolic blood pressure of the choroidal arteries was apparently higher than that of the retinal artery.

Dohrmann K. Pischel.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Cardello, G. **The effect of acetylcholine upon the visual field in optic nerve diseases.** Rassegna Ital. d'Ottal., 1934, v. 3, Sept.-Oct., p. 764.

After discussing the derivation and general action of acetylcholine, Cardel-

lo describes in detail the effect of the drug upon the visual fields in ten cases, two of optic atrophy, six postinflammatory, one of pigmentary degeneration, and one of peripapillary edema. The drug was injected intramuscularly, and if the reaction was negative the second dose was given retrobulbarly. In five cases there was enlargement of the field of vision or a decrease in the area of the scotoma. In one case retrobulbar injection was followed by marked increase in intraocular tension, with intense pulsation of the central artery on the disc. Improvement following injection is useful as a prognostic and therapeutic guide. Eugene M. Blake.

Finkelman, I., and Wick, S. **Pressure on the optic nerve by carcinoma of the maxillary sinus extending into the cranial cavity.** Arch. of Ophth., 1934 v. 12, Sept., pp. 366-376.

A man aged fifty-one years developed pain in the right side of the head, loss of hearing in the right ear, and nasal obstruction on the right side, as results of a transitional cell carcinoma of the maxillary sinus and nasopharynx. In spite of radiation, the tumor invaded the cranial cavity, compressed the right optic nerve and produced optic atrophy. Increased intracranial pressure resulted in papilledema in the left eye, mental apathy, confusion, and stupor. Death resulted from bronchopneumonia. Autopsy findings are reported in detail and are illustrated by photomicrographs. (Discussion.) J. Hewitt Judd.

Fournier, J. C. M., and Helguera, R. A. L. **Optic nerve and myxedema.** Endocrinology, 1934, v. 18, July-Aug., p. 527.

A woman of twenty-four years developed symptoms of thyroid deficiency with headaches, chilliness, and drowsiness. The symptoms completely disappeared during two pregnancies and reappeared promptly after parturition. Failure of vision was first noticed after the second parturition. Some improvement in vision was secured with iodine therapy. After the birth of a third child, marked reduction in vision occurred. Examination at this time revealed optic atrophy in the right and papillitis in the left eye. X-ray examinations gave no evidence of pituitary hypertrophy. Under thyroid medication the vision of the left eye improved. For fifteen years the patient has remained well and has retained useful vision, under careful continuation of thyroid treatment. The literature is reviewed.

Edna M. Reynolds.

Venco, L. **Considerations on three cases of optic nerve atrophy of nasal origin.** Boll. d'Ocul., 1934, v. 13, Feb., pp. 267-314.

These cases were in patients of middle age. The affection was bilateral, in two cases the atrophy was due to compression by inflammatory products, in one to spasm of the nutritive vessels of the optic nerve. The visual fields varied, one case showing bitemporal hemianopia. All manifested rapid loss of vision, and opening the sphenoid sinuses improved vision except as limited by the amount of optic nerve atrophy. (Bibliography, nine figures.)

M. Lombardo.

Werner, A. **Concerning tabetic-like symptoms following diphtheria (post diphtheritic pseudotabes).** Deut. med. Woch., 1934, Oct. 12, p. 1543.

The author states that following diphtheria, permanent reflex pupillary rigidity, permanent absence of the patellar reflex, sluggish Achilles reflex, and slight disturbances of sensibility may occur. He suggests that many cases of so-called tabes in which the spinal fluid is negative may have had diphtheria which could account for the symptoms. Theodore M. Shapira.

12. VISUAL TRACTS AND CENTERS

Drake, R. L. **Ocular syphilis. 5. Binasal hemianopia associated with primary optic atrophy in tabes dorsalis.** Arch. of Ophth., 1934, v. 12, Oct., pp. 583-589.

The nature of the pathologic process of primary optic atrophy of syphilitic

origin is discussed and the findings previously reported are summarized. The six cases presenting binasal hemianopia previously reported are briefly summarized. The author reports the case of a man of thirty-six years in which this syndrome was present. The visual acuity decreased rapidly in spite of intensive treatment. Perimetric charts show the rapid changes in the field.

J. Hewitt Judd.

Hamill, R. C. **Tubular vision.** Arch. of Ophth., 1934, v. 12. Sept., pp. 345-351.

Three cases with this condition are reported in patients suffering from hysteria. In the third case, that of a boy of twelve years, the mechanism of production of the tubular field is carefully traced, showing how mental factors caused ignoring of all but the center of the visual field. (Discussion.)

J. Hewitt Judd.

Seale, E. A. **Recovery of sight and health in a case of gigantism.** South African Med. Jour., 1934, v. 8, May 26, p. 371.

A case of gigantism in a boy of ten years whose vision had been failing for six months is reported. He could count fingers at nine feet with the right eye and the left eye was blind when he was first seen. Both optic discs showed temporal pallor. He had the apathy, severe headaches, and vomiting without nausea which characterize increased intracranial pressure, and radiographs of the skull showed enlargement of the sella turcica. Six days after he was first seen, he suddenly regained his vision and became alert and active. Vision in each eye was 6/60. After a few days the vision improved to 6/36 in the right eye and 6/12 in the left eye. The author explains this unusual occurrence as probably due to spontaneous decompression following rupture of a cyst in the pituitary gland. Edna M. Reynolds.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth
640 S. Kingshighway, St. Louis

News items should reach the Editor by the twelfth of the month.

Deaths

Dr. Clarence Anson Neighbors, Anaheim, California, aged 54 years, died November 14, 1934.

Dr. Duncan Neil Macleman, Toronto, Ontario, died Oct. 19, 1934.

Dr. Edward John Hussey, Holyoke, Massachusetts, aged 61 years, died December 4, 1934, of bronchopneumonia.

Dr. Henry Byrd Young, Burlington, Iowa, died December 10, 1934, of uremia.

Dr. John Francis Healey, Buffalo, New York, aged 41 years, died November 30, 1934, of coronary sclerosis.

Dr. Lewis Stephen Pilcher, Brooklyn, New York, scholar and editor for half a century of the oldest surgical journal in the United States, the *Annals of Surgery*, died December 24, 1934, aged 89 years.

Dr. J. H. French, Hartford City, Indiana, died November 12, 1934.

Dr. Morie F. Weymann, Los Angeles, California, died January 13, 1935, aged 35 years.

Miscellaneous

The American Board of Ophthalmology will conduct examinations in Philadelphia, June 8, 1935, and in New York City, June 10, 1935. Application must be filed at least 60 days before date of examination. Address communications to: Dr. Wm. H. Wilder, 122 South Michigan Ave., Chicago, Ill.

The Italian Ophthalmological Society (address, in Rome; secretary, E. Leonardi) announces that, in addition to a number of competitions limited to Italian ophthalmologists, the Cirincione prize of 20,000 lire will be open to international competition. This prize will be awarded for an original memoir appearing during 1934 or 1935. The work must be written in the Italian language, typewritten in three copies, not later than August 31, 1935. Titular professors and those beyond the age of forty-five years are excluded. In addition to the prize, gold medals will be awarded to the second and third ranking competitors.

Dr. Crisp states that he has received from Dr. Otis Wolfe of Marshalltown, Iowa, a letter approving the statements made as to the quality of work in ophthalmic surgery shown at Barcelona (see December issue, page 1168), but suggesting that the statement

as to Dr. Barraquer's command of the English language is overdone. The writer of the editorial regrets any excess of statement in this respect, but had based his impression upon recollection of Dr. Barraquer's demonstration of the vacuum operation before the Washington Congress in 1922.

The International Hospital Association announces that the fourth International Hospital Congress will be held in Rome, May 5 to 12, 1935. Preliminary study trips to Milan, Turin, Genoa, and Florence will precede the Congress, beginning April twenty-eighth at Milan. Particulars of the conferences of the study committee and subcommittees appear in Nosokomeion, official organ of the International Hospital Association, for January, 1935.

Societies

The Western Ophthalmological Society will meet in Portland, Oregon, on May 24, 1935.

The Pacific Coast Oto-Ophthalmological Society will meet in Portland, Oregon, on May 20, 21, 22, and 23, 1935. The officers of the Society for 1935 are: president, Dr. Frank Kistner, Portland, Oregon; first vice-president, Dr. S. S. Howe, Bellingham, Wash.; second vice-president, Dr. C. W. Pond, Pocatello, Idaho; secretary-treasurer, Dr. Frederick C. Cordes, San Francisco, California.

The Brooklyn Ophthalmological Society on December 20, 1934 presented the following scientific program: A critique of the various operations for glaucoma, by Harry S. Gradle, M.D., Chicago. Cases were presented by Cyrus Lack, M.D., and Daniel Kravitz, M.D.

The Eye Section of the Philadelphia County Medical Society on December 6, 1934, presented the following program: Dr. Ronald A. Cox, Head nodding and nystagmus; Dr. George Schwarzkopf, Eye changes in Paget's disease; Dr. Edmund B. Spaeth, Macular tuberculosis; Dr. Alvin W. Howland, Treatment of postoperative infections by Pregl's iodine; Dr. Aaron Brav, Is friction a causal factor in senile cataract.

The Eye Section of the Philadelphia County Medical Society on January 3, 1935, presented the following program: Dr. J. M. Rosenthal, A typical retinitis proliferans; Dr. Charles W. LeFeber, Conical cornea case wearing contact lenses; Dr. C. E. G. Shannon and Dr. Carroll Mullen, Lacrimal cases; Dr. J. Parsons Schaeffer, Applied anatomy and physiology of the nasolacrimal apparatus.

The Southeastern Surgical Congress announces the sixth annual assembly of the Congress which will be held in Jacksonville, Florida, March 11, 12, and 13, 1935. The states composing the Congress are Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. A partial list of those who have already accepted places on the program is as follows: Drs. Walter C. Alvarez, Perry Bromberg, Hugh Cabot, Willis C. Campbell, George W. Crile, John F. Erdmann, Paul Flothow, Ralph Green, Arthur Hartzler, C. Jeff Miller, Alton Ochsner, J. C. Patterson, J. Knox Simpson, J. W. Snyder, and W. A. Weldon.

For information address Dr. B. T. Beasley, Secretary-treasurer, 1019 Doctors Building, Atlanta, Georgia.

NOTICE

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